



THE FLINTLOCK MUSKET

Brown Bess and Charleville 1715–1865

STUART REID



Author

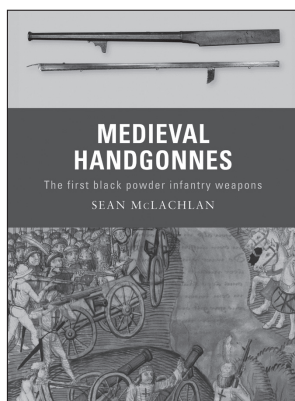
Stuart Reid has worked as a librarian and a professional soldier, with his interest in the 18th and 19th centuries stemming from having ancestors who served in the British Army and the East India Company and who fought at Culloden, Bunker Hill and even in the Texas Revolution. His books for Osprey include highly acclaimed titles such as *King George's Army 1740–93* and *British Redcoat 1740–1815*.

Illustrators

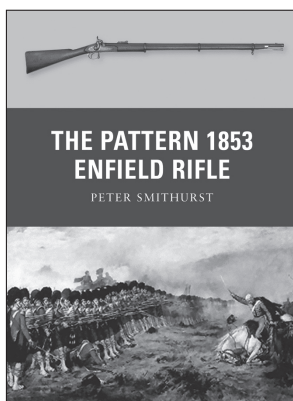
Steve Noon was born in Kent, UK, and attended art college in Cornwall. He's had a life-long passion for illustration, and since 1985 has worked as a professional artist. An award-winning illustrator, Steve has illustrated over 30 books for Osprey.

Born in Malaya in 1949, Alan Gilliland studied photography/film and architecture, and has worked as a photojournalist and cartoonist. He spent 18 years as the graphics editor of *The Daily Telegraph*, winning 19 awards in that time. He now illustrates for a variety of publishers (www.alangilliland.com).

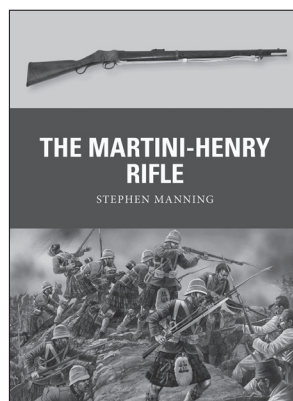
Other titles in the series



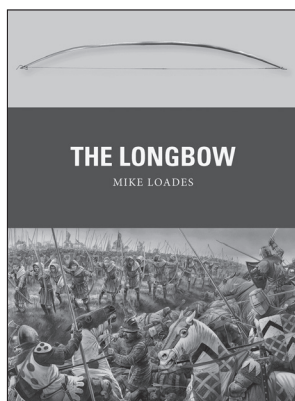
WPN No: 3 • ISBN: 978 1 84908 155 9



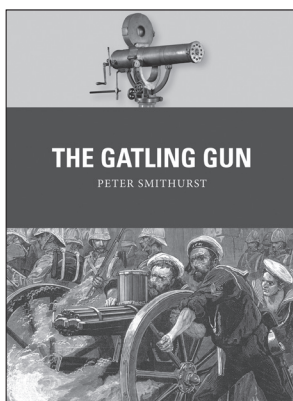
WPN No: 10 • ISBN: 978 1 84908 485 7



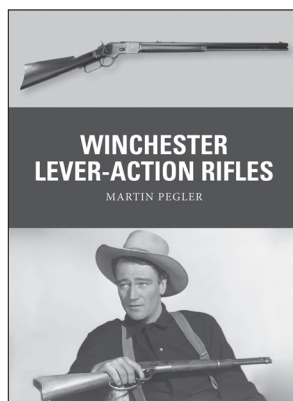
WPN No: 26 • ISBN: 978 1 78096 506 2



WPN No: 30 • ISBN: 978 1 78200 085 3



WPN No: 40 • ISBN: 978 1 4728 0597 3



WPN No: 42 • ISBN: 978 1 4728 0657 4



THE FLINTLOCK MUSKET



STUART REID

Series Editor Martin Pegler

This electronic edition published 2016 by Bloomsbury Publishing Plc

First published in Great Britain in 2016 by Osprey Publishing,
PO Box 883, Oxford, OX1 9PL, UK
PO Box 3985, New York, NY 10185-3985, USA
E-mail: info@ospreypublishing.com

Osprey Publishing, part of Bloomsbury Publishing Plc

© 2016 Osprey Publishing Ltd.

All rights reserved. Apart from any fair dealing for the purpose of private study, research, criticism or review, as permitted under the Copyright, Designs and Patents Act, 1988, no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, electrical, chemical, mechanical, optical, photocopying, recording or otherwise, without the prior written permission of the copyright owner. Enquiries should be addressed to the Publishers.

A CIP catalogue record for this book is available from the British Library

ISBN (print): 978-1-4728-1095-3
ISBN (ePub): 978-1-4728-1097-7
ISBN (ePDF): 978-1-4728-1096-0

Index by Rob Munro
Typeset in Sabon and Univers
Originated by PDQ Media, Bungay, UK

To find out more about our authors and books visit www.bloomsbury.com. Here you will find extracts, author interviews, details of forthcoming events and the option to sign up for our [newsletters](#).

Osprey Publishing supports the Woodland Trust, the UK's leading woodland conservation charity. Between 2014 and 2018 our donations are being spent on their Centenary Woods project in the UK.

www.ospreypublishing.com

The NRA Museums

Since 1935, the NRA Museum collection has become one of the world's finest museum collections dedicated to firearms. Now housed in three locations, the NRA Museums offer a glimpse into the firearms that built our nation, helped forge our freedom, and captured our imagination. The **National Firearms Museum**, located at the NRA Headquarters in Fairfax, Virginia, details and examines the nearly 700-year history of firearms with a special emphasis on firearms, freedom, and the American experience. The **National Sporting Arms Museum**, at the Bass Pro Shops in Springfield, Missouri, explores and exhibits the historical development of hunting arms in America from the earliest explorers to modern day, with a focus on hunting, conservation, and freedom. The **Frank Brownell Museum of the Southwest**, at the NRA Whittington Center in Raton, NM, is a jewel box museum with 200 guns that tells the history of the region from the earliest Native American inhabitants through early Spanish exploration, the Civil War, and the Old West. For more information on the NRA Museums and hours, visit www.NRAMuseums.com.

Author's note

I would like to acknowledge the very kind assistance and advice of Dr Stephen Bull of the Lancashire Museums Service, as well as the National Firearms Museums and the Anne S.K. Brown Military Collection, Brown University Library, Providence, Rhode Island. Other than as specifically credited, all images are from the author's collection.

Strictly speaking, the British Army only came into existence after the Union of 1707, but in practical terms the Scots and English armies had served as one since the restoration of King Charles II in 1660. For convenience, therefore, both are referred to as British irrespective of their actual point of origin.

Editor's note

In this book linear, weight, and volume measurements are given in imperial units of measurement (yards, feet, inches, pounds, ounces, grains). Where imperial units of measurement differ from US customary, the former are used in the text. The following data will help when converting between imperial and metric measurements:

1yd = 91.44cm
1ft = 30.48cm
1in = 2.54cm
1lb = 0.45kg
1oz = 28.35g
1 grain = 0.002oz
1 grain = 0.064g

Front cover images: NRA Museums, NRAMuseums.com (top); Osprey Publishing (bottom).

Title-page image: Claude-Louis-Hector, duc de Villars, is shown leading French forces at the battle of Denain (24 July 1712) in this 19th-century work by Jean Alaux (1786–1864) which provides a surprisingly accurate picture of the uniforms and equipment of the day. (Public Domain)

Artist's note

Readers may care to note that the original paintings from which the battlescenes in this book were prepared are available for private sale. All reproduction copyright whatsoever is retained by the Publishers. All enquiries should be addressed to:

www.steve-noon.co.uk

The Publishers regret that they can enter into no correspondence upon this matter.

CONTENTS

INTRODUCTION	4
DEVELOPMENT Creating a game-changer	7
USE The search for a tactical doctrine	26
IMPACT The dominance of infantry firepower	61
CONCLUSION	75
GLOSSARY	78
BIBLIOGRAPHY	79
INDEX	80



INTRODUCTION

The flintlock musket (in British service more commonly known simply as a firelock, or the legendary ‘Brown Bess’) can fairly claim to be one of the most iconic weapons of all time. It was with flintlock and bayonet that Marlborough and Frederick the Great made their reputations. It was with flintlock and bayonet that Britain, France and Spain contested for control of the North American colonies. Later, it was flintlock-armed Minutemen who first challenged Britain’s hard-won hegemony over those colonies at Lexington, Concord and Bunker Hill; and it was French flintlocks which helped facilitate victory in that struggle. Ironically, those same flintlocks which had defeated one empire then went on to create new empires both under Napoleon in Europe, and under the Stars and Stripes in the vastness of the American south-west; and if British ambitions in North America were thereby frustrated, it was the flintlock muskets of the East India Company which won Britain a new empire in the Indian subcontinent and beyond. Ironically, it was in turn the East India Company-designed India Pattern musket which would eventually challenge the Charleville musket of Napoleon’s forces in the climactic battle of Waterloo.

As a weapon the musket itself was not new: in its most basic form it can be seamlessly traced back to the medieval ‘handgonne’. Seemingly originating in China in the 11th century and making its way to Europe by the 14th century, it comprised a simple iron tube or barrel, sealed at one end. A measured charge of gunpowder was poured down the open end and when ignited through a narrow hole bored through the side of the barrel, the gunpowder charge propelled a lead ball or bullet towards the desired target. In order to flash a flame through the narrow hole and thus fire the weapon, it was necessary first to ignite a small priming charge of gunpowder laid in a shallow pan on the outside of the barrel – hence the terms ‘priming pan’ and ‘touch-hole’. In its earliest form, this priming charge was ignited by literally touching it, first with a heated iron rod and latterly with a burning piece of chemically treated cord or ‘slow-match’.



Either could be held in the soldier's hand, but as he obviously needed to look at what he was doing, taking aim while doing so was impossible. Therefore, sometime in the mid-15th century, a simple mechanism or 'lock' was devised to do the job of igniting the priming charge, thus allowing the soldier to squint along the barrel as it did so.

Mechanically, the matchlock was simple and fairly robust, but using it in combat was complicated and to a degree compromised by the separate elements that needed to be brought together. In the first place the soldier had to carry around with him a length of slow-burning match-cord. This was served out in the same proportions as the rest of his ammunition: 1lb of powder, 1lb of lead shot and 1lb weight of slow-match. The inconvenience of having to carry around 1lb of slow-match was made all the more so because inevitably a considerable proportion of a soldier's time is spent waiting, and during that time an equally prodigious amount of match-cord might be consumed to no purpose – but if it were not kept lit, precious time might be lost in lighting it when it was needed. Slow-match was also temperamental. It was susceptible to damp, not just in falling rain which was liable to extinguish it entirely, but in 'damning' it so that although it might be smouldering, the burning ember might not actually be hot enough to ignite the gunpowder. Even under optimal conditions the loading process required the match to be detached from the musket, then reset in the clamp in the right place to ensure that the glowing end would descend precisely into the priming pan. If, of course, the soldier was kept waiting for any time, the match would need to be constantly adjusted as it burned down. Not surprisingly, accidents were common, it being all too easy for the soldier to forget that he was carrying a lighted match in the presence of gunpowder. Even without those complications there were tactical drawbacks in that the smoke (and the smell of it), and at night the glow of the match, rendered concealment or a stealthy approach difficult.

The solution was the firelock, so called because by striking a flint against a steel or frizzen, the lock or mechanism reliably created its own fire to ignite the powder – and did so only as and when required. The

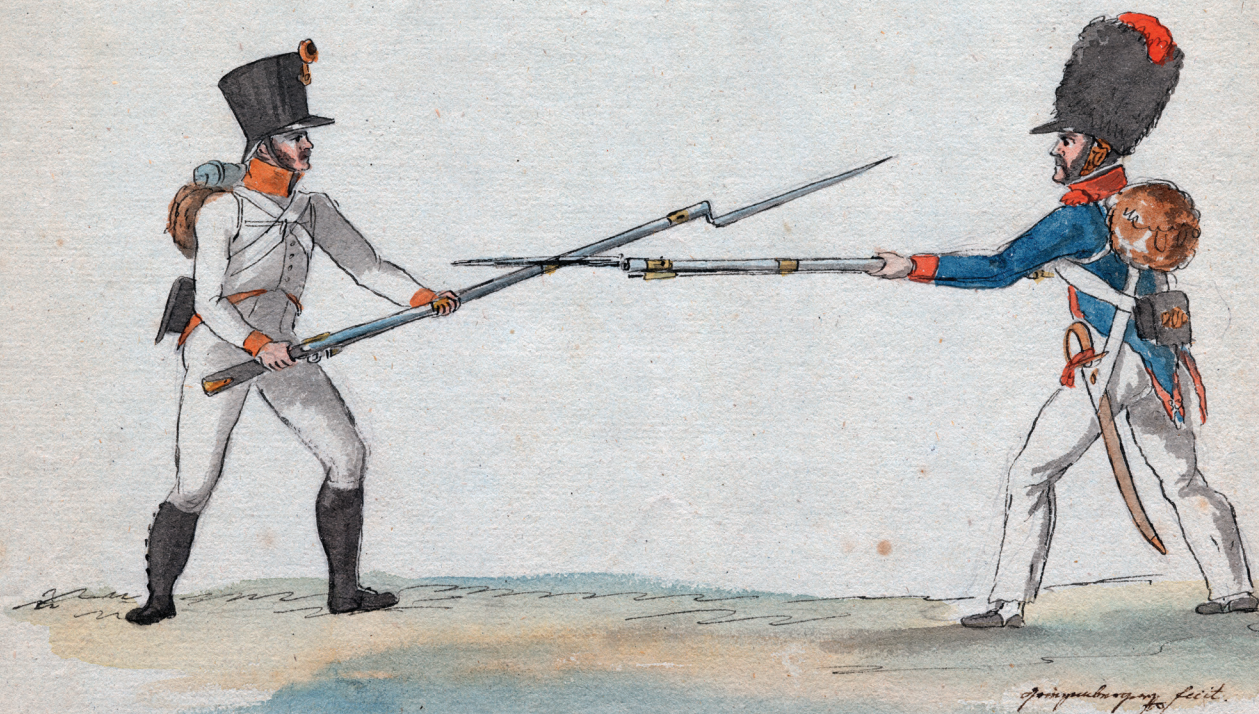
This Spanish firearm of the late 16th or early 17th century is an absolutely typical example of the matchlock musket, and is identical to those illustrated by Jacob de Gheyn II (1565–1629) that appear later in this book. Both its simplicity and its limitations are immediately apparent. In order to make it ready for firing, after the main charge of powder and ball had been loaded via the muzzle of the barrel, the pan over in the centre had to be opened and a priming charge of powder sprinkled into the pan. The pan cover was then closed again while a slow-burning match-cord was fixed into the curved pan and its setting checked by lowering it gently towards the pan. If satisfied, the soldier would then adopt a firing position, flick open the pan cover again and on the word of command pull the trigger to bring the burning match down on the exposed priming charge. (NRA Museums, NRAMuseums.com)

Dating from 1813, this watercolour shows an Austrian infantryman (identified by his single-breasted white jacket and double-peaked shako) engaged in bayonet practice with a fur-capped French grenadier. By this period bayonet fencing was being widely cultivated as a skill in its own right, and this appears to be a preliminary sketch for one of the many broadsheets which appeared, illustrating sequences of the various individual thrusts and guards specially developed by fencing masters. Their actual utility in what was necessarily a brutal business without rules is perhaps questionable. Nevertheless, the colourful broadsheets were very popular and normally depicted the duellists, whether fighting with bayonets or with swords, in the uniforms of opposing armies – with the soldier finally receiving the fatal thrust invariably being an enemy soldier. (Anne S.K. Brown Military Collection, Brown University Library)

weapon could now be loaded in advance, sometimes a long time in advance. It could be carried in a variety of ways over all kinds of terrain, and in adverse weather conditions, in daylight or in the dark, and then made ready to fire in a matter of seconds. Moreover, once it had been fired it could be reloaded and fired again quickly and easily, and a bayonet could be fitted to it for close-quarter fighting.

The importance of this development cannot be overstated, for it was not simply a matter of the technical improvement of an existing weapon, the musket, but in effect the creation of an entirely new firearm. In the wars of the 16th and 17th centuries the musket had proved to be an increasingly important weapon, but at the same time it was just one component in a complex military machine which featured a variety of specialist weapon systems. For much of the period the pikeman was regarded as the more important arm, and the musketeer's role initially was no more than to provide fire support for the assault or the defence against it. Over time that role grew in importance and the numbers of musketeers grew accordingly, so that by the latter stages of the English and French civil wars in the 1640s most infantry – and in some engagements all of them – were armed with muskets. Nevertheless, the technical limitations of the matchlock still precluded the musket from realizing its full potential.

That changed with the adoption of the firelock or flintlock, which not only overcame those limitations but exponentially exceeded them with the addition of the bayonet, thus making each musketeer his own pikeman. The military revolution which began with the introduction of gunpowder was complete, for almost inadvertently the flintlock musket had created the universal soldier.





DEVELOPMENT

Creating a game-changer

ORIGINS

Given the flintlock musket's role as the first universal infantry weapon, it is ironic that on the battlefield at least its mechanism was probably first seen in cavalry weapons. The increasing weight of some horsemen's armour in the 16th and early 17th centuries meant that rather than ineffectually batter away at armour with a sword, a cavalryman needed to be able to drive a ball straight through it. However, the requirement for carrying and applying a length of burning cord in order to fire a handgonne or matchlock meant that although occasionally illustrated, it was impractical to use such a weapon on horseback.

The wheel-lock

The solution lay in the adoption of the firelock, initially in the form of the wheel-lock – a relatively complicated mechanical device developed for the civilian market, principally for use in hunting firearms or for personal defence. In essence the wheel-lock was a spring-actuated clockwork mechanism in which a V-shaped mainspring was attached to the spindle of a serrated wheel by a small chain. When the wheel was wound up by a special key (not unlike a modern Allen key), the spring was compressed and then held in place by a sear or rocking lever. When the sear was disengaged by squeezing a trigger, the serrated wheel then spun round, coming into contact as it did so with a piece of flint or pyrites held in a moveable clamp whereupon the resultant shower of sparks ignited the priming charge.

The advantages were obvious. A second hand was briefly required to wind the wheel back against the spring, but thereafter it could be carried



This French wheel-lock sporting rifle dates to c.1560. Unlike other European wheel-locks, French arms contain their wheel inside the gun, making them more impervious to moisture. (NRA Museums, [NRAmuseums.com](https://www.nramuseums.com))

safely in one hand or in a holster until actually required. It was also fired one-handed, and so could be used in close combat. Indeed, experience quickly showed that it was often most effective not as a missile weapon in the conventional sense of being discharged at a distance from the target, but by jamming the muzzle hard against an opponent before squeezing the trigger.

The wheel-lock was soon adapted for use on longer-barrelled weapons, usually for hunting, or for equipping personal or household guard units both as a matter of practicality and prestige. Nevertheless, while the wheel-lock was an undoubted advance on the simple matchlock, it suffered from a number of drawbacks which ultimately rendered it unsuitable as a military weapon. For those who could afford weapons of the highest quality this was not an issue, but munition-quality weapons were often plagued with reliability issues. In particular, if it was ‘spanned’ or wound up for too long, there was an unfortunate tendency for the mechanism to set or jam – often at an extremely awkward moment. Not surprisingly, using the butt end of the weapon as a club or even throwing it was frequently resorted to.

The flintlock

A simpler mechanism was required, and this was found sometime in the 1540s or 1550s in the form of what became known as the *snaphaunce* or *snaphance*. The term is Dutch, but it is by no means certain that this mechanism was first developed in the Netherlands – although it does appear to belong to northern rather than southern Europe. At any rate, this was essentially a modification of the wheel-lock rather than a completely new design. The wheel and chain were dispensed with and the clamp for the pyrites reversed to take its place. Previously, the clamp had simply been held backwards against the wheel by a relatively weak spring acting on the arm, which otherwise had no mechanical function as such. Now rather heavier in form and located behind the priming pan, the clamp was rocked backwards until a notched disc or ‘tumbler’ mounted on the inside engaged with the sear.

Squeezing the trigger then disengaged the sear exactly as before, but this time allowing the heavy mainspring bearing down on a flange extending from the tumbler to snap the clamp (or as it now became known, the cock, apparently because in snapping forward it resembled the pecking motion of an angry cock bird) forward rather than back. At the same time, the original clamp on the end of the spring-loaded arm ahead of the priming pan was replaced by a straight or slightly convex hardened-steel plate. Again, the arm held the plate above the priming

Rifled firearms

This study deals with smooth-bore weapons, but it is important to acknowledge the parallel development of rifled firearms. It had long been known that imparting a spin to missiles increased their accuracy by making them fly straight and true, and it was eventually determined that musket balls could be made to spin by cutting spiral grooves into the inside of the gun barrel, as described by Henry Wilkinson in 1841:

Rifled barrels are only used for throwing balls; they are always much thicker and heavier than barrels intended for shot, in order to render the aim more steady, as well as to admit of cutting the grooves with safety. Rifling consists in cutting any number of grooves in a spiral direction down the inside of a barrel, usually from seven to fifteen, dividing the interior surface into *lands* and *furrows*, the sunk parts being called the *furrows*, and the original surface left, the *lands*.

In order to diminish friction, as well as to impress the ball more readily, the lands ought to be narrower than the furrows. The object of the rifling is to give the ball a rotational coincident with the line of its flight, and thus to correct the variable rotation which every ball, passing freely along a smooth bored barrel, receives from its friction against the sides. The latter rotation never can coincide with the axis of the barrel, but must have a tendency to deflect the ball from the line of aim, according to the last impulse it may receive on quitting the barrel. Rifling

also corrects any inequality in the density of the ball itself, by causing it to present alternately every part of its surface in its passage through the air, from which it is evident that straight grooves can be of no use whatever, as they cannot communicate rotation to the ball. (Wilkinson 1841: 106–07)

The invention, or rather the practical application, of the rifling process is variously credited to two German-speaking gunmakers, Gaspard Koller (or Kollner) of Vienna, and August Kotter of Augsburg, both of whom were active in this field around 1520. Rifled guns were thus already in existence from the very beginning of the development of the flintlock, initially in the form of hunting weapons and occasionally pistols. Even when introduced to the battlefield, rifled guns were few in number and the preserve of specialists, the latter frequently recruited from among huntsmen (*Jäger*, in the German). The relative scarcity of rifled guns was due in part to their cost and to the specialist skills required, but also to the time required to load such weapons, which is why Napoleon opposed their use in the French Army. Broadly speaking, the loading process was the same as that for an ordinary flintlock musket, but it was necessary to force the lead ball into the rifling – a necessity that could require the ball literally to be hammered in using a small mallet. Therefore, while improvements in tooling and the manufacturing processes gradually reduced the relative costing of the rifle, it would remain unsuitable for more widespread use until the invention of what became known as the Minié ball in the 1840s.



ABOVE In 1800 the British Army adopted a pattern rifle, commonly known as the Baker. This was not the first rifle used in the British or any other army, but previous examples had mostly been obtained from a variety of private manufacturers. With a barrel length of just 30in, the Baker rifle was initially made in two different calibres: a so-called musket bore, which was actually the same .68 used for the 1757 carbine; and a quite unique .62 carbine bore, which, after the first few months of production was adopted as standard. Although the primary role of riflemen was as sharpshooters, experience in North America had shown them to be vulnerable to bayonet-armed infantry, and so a bayonet was accordingly provided for defensive purposes. Although some earlier carbines had been provided with long-branched or 'spear' socket bayonets, the short barrel of the Baker rifle obviously required a correspondingly longer bayonet, and so it was provided with a *Jäger*-style *Hirschfänger* or sword-bayonet which clipped on to the side of the barrel. (NRA Museums, NRAMuseums.com)

pan; when the cock snapped forward, the stone held in the clamp struck sparks off the steel. It was very quickly realized, however, that pyrite was far too brittle to be struck so violently against the steel, and so it was replaced by a suitably knapped or wedge-shaped piece of flint.

There was no question of a complete replacement, and wheel-locks continued to be made for all types of guns – including rifled hunting weapons – for at least the next hundred years, but in a military context the snaphaunce rather than the wheel-lock became for a time the firelock of choice for infantry weapons. This was largely because it was cheaper and more robust than the wheel-lock; sufficiently so to encourage a certain degree of mass production. It was still, however, very much a specialist weapon and largely the preserve of designated firelock companies. Sometimes these were guard units thus equipped for reasons of prestige and safety – and to avoid an excessive consumption of slow-match. Some firelock companies were effectively employed as ranger units, however, because their weapons could be made ready without the attendant smoke that would betray them by day or glowing match-cord to reveal them by night. Others were parcelled out in a more piecemeal fashion: on 28 September 1644 a total of 126 firelock muskets were received by the Scots army from a magazine at Sunderland belonging to the English Parliamentarian, Sir Harry Vane (Terry 1917: 1.21). Within the week they were distributed to a number of regiments serving in England, each of which received six firelocks apiece, with the exception of the Lord Chancellor's Regiment, which got eight. The purpose of these firelocks is not clear, but they may simply have been passed around sentries in order to prevent undue wastage of slow-match. Four years later, in 1648, rather than being dispersed piecemeal as before, the weapons were reissued en bloc to the two companies making up Fraser's Firelocks, and this appears to have been fairly typical.

It is not clear whether these firelocks were actually snaphaunces, for they were already going out of fashion and had effectively disappeared by the 1680s. This was largely because there was still a degree of over-complication in that it was necessary manually to set the steel and open the pan-cover before firing, although some mechanisms contrived to do it automatically. Nevertheless, at the beginning of the 17th century, if not

This Italian snaphaunce pistol features a folding stock to enable its owner to conceal it under a cloak. (NRA Museums, NRAMuseums.com)



slightly earlier, some genius realized that if the pan cover were to be hinged forwards rather than sideways and the steel or frizzen attached to the rear of the pan cover at a 90-degree angle (or thereabouts), the flint would not only strike upon it but simultaneously throw it forwards, thus opening the pan to receive the resultant shower of sparks.

This development, known as a Snaplock or Snapwark and sometimes later variously identified as a Baltic Lock or an English Lock, was again much simpler, albeit surprisingly crude in appearance. However, while comparatively more reliable, an unfortunate deficiency remained in the design. In theory, when cocked the weapon would only fire if the trigger was squeezed to disengage the sear from the tumbler. Alas, not only were negligent discharges common, but jolting or dropping the weapon could also see it fire of its own accord, especially if the manufacturing tolerances were sloppy. What was required was some kind of safety device.

The first solution was the addition of a ‘back-ketch’, or ‘dog’, which clipped into a notch in the rear of the cock and prevented it going forward unless manually disengaged. Initially, weapons so fitted were sometimes known as ‘half-bent’ locks, since it was literally half-bent or half-cocked after loading. This allowed the pan to be primed and the cover to be closed over it, while the dog was then automatically disengaged by fully drawing back the cock as and when the user was actually ready to fire the weapon. This safety catch worked reasonably well, and the dog-lock was therefore used for both military and hunting weapons well into the 18th century.

By then, however, it had been superseded by the invention of the fundamentally similar but simpler and more reliable fusil (from the Italian *fucile* or flint), which is credited to a multi-talented gentleman named Marin le Bourgeoys. Born into a noted family of artisans in Normandy in about 1550, Bourgeoys attained a degree of fame as an artist, inventor and gunsmith. In 1598 he was appointed a *valet de chambre* (royal servant), and by 1608 he had a workshop in the Louvre Palace. There he was employed, among various other duties, in making high-quality firearms both for the king’s own use and as gifts for favoured courtiers and foreign princes and dignitaries. In so doing he not only refined the quality of the pieces he made, but the actual mechanisms as well, and sometime between 1610 and 1615 he completed the evolution of the flintlock into what would be its classic form.

The internal arrangement of the lock was simplified, and by cutting a second and rather deeper notch in the tumbler below the first Bourgeoys created a secure half-cocked position, removing the requirement for an external safety catch. This invention gave French military muskets a pre-eminence they never lost – a point underscored by the fact that Bourgeoys’ lock was simply known as the French Lock. In due course the French Lock was universally adopted throughout Europe; and having cleaned up the original rather cluttered prototype, work was undertaken to improve the lock’s appearance. The rather crude and ugly pan cover and steel assumed a more aesthetically pleasing rounded shape, while the equally crude S-shaped cock gave way to a more elegant swan-shaped style – but this

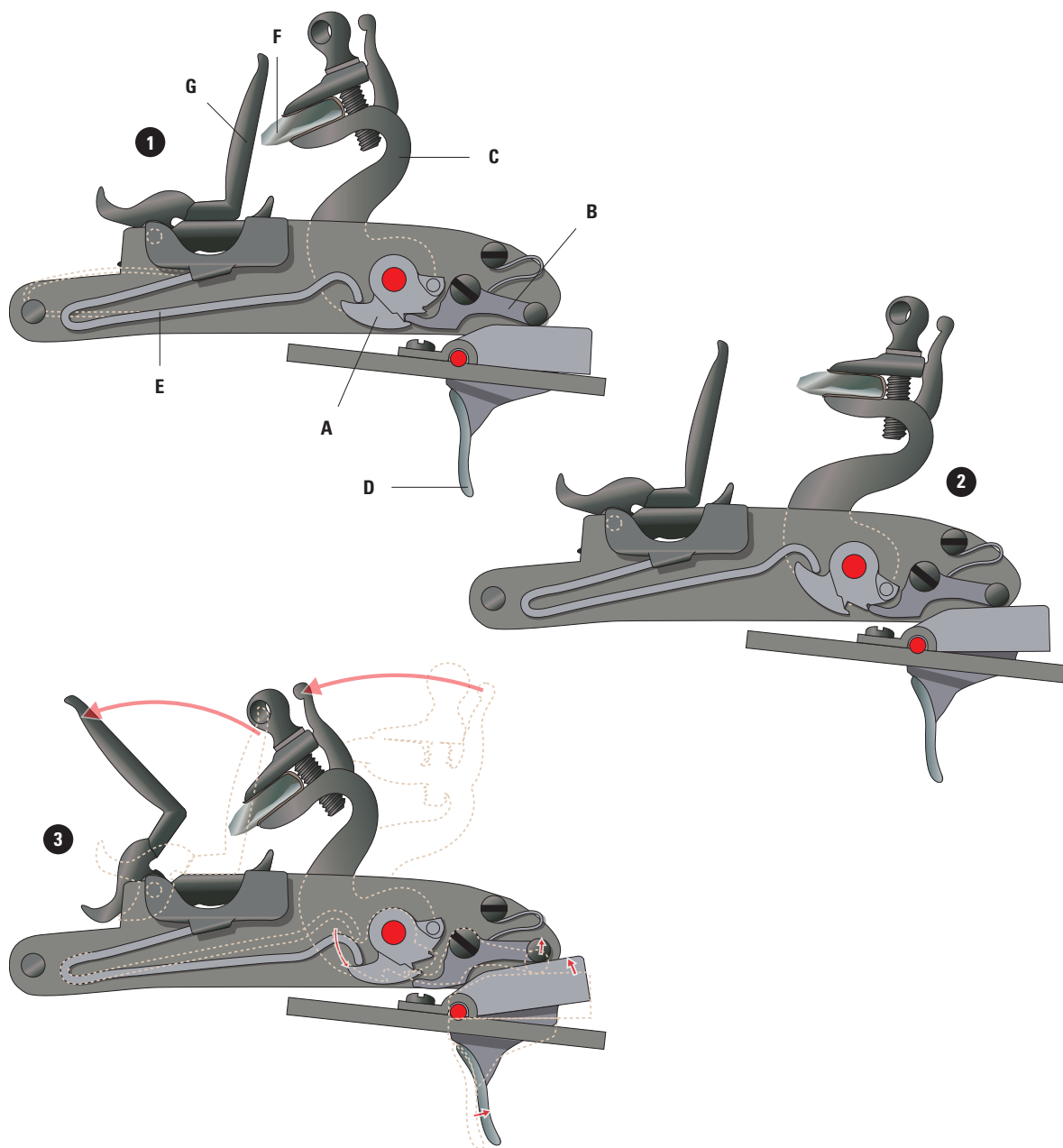
eventually proved to be insufficiently robust for military use and had to be reinforced with a ring set into the neck.

Internally, there were to be some functional improvements too, but these were largely minor in nature. The most important improvement was the introduction of a 'bridle' in the 1680s. This was a small bridging plate first attached over the tumbler and then extended to cover the sear. This did not alter the functionality of the lock in any way but provided a bearing for the otherwise unsupported end of the tumbler axle, thus rendering the lock more robust and less susceptible to 'getting out of order'. Similarly, an external bridle was extended forward from the priming pan to support the screwed axle of the steel, and by the mid-18th century this had evolved into a double bridle centring the priming-pan cover. Inserting a roller in the end of the arm or peg bearing on the frizzen spring made for a smoother operation. A gently dished priming pan ensured that the priming charge drained towards the touch-hole; and there were even attempts to render the priming pan waterproof which included a sliding cover for the touch-hole, although few such innovations found their way into military use. However, all of these alterations and improvements, successful or otherwise, were merely refinements, and in its final form the flintlock mechanism was still very similar to that perfected by Marin le Bourgeois in the Louvre Palace at the beginning of the 17th century.

DIVERGENT DEVELOPMENT

As to the weapon itself, most muskets for the French Army were produced at three arsenals. In 1665 an adviser to the Parliament of Paris, Maximilien Titon de Villegenon, seigneur d'Ognon, assumed responsibility for maintaining a stockpile of weapons for the king's troops at the *Magazin Royal* housed in the Bastille. Initially, there was no official specification or pattern beyond the calibre and barrel length, and manufacture was contracted out to gunmakers at Saint-Étienne and other traditional areas. With the French Army almost continuously at war over the next 50 years, it then became necessary to establish two Royal factories – Charleville and Maubeuge in 1678 – while weapons for the Ministry of Marine largely came from a factory established in 1691 at Tulle, near Liège. Most weapons, however, continued to come from private individuals or entrepreneurs.

A similar process was followed in England, where the Board of Ordnance based at the Tower of London was primarily a receiver rather than a manufacturer of muskets other than by the setting up of components. For the most part the manufacture of muskets was contracted out to independent gunmakers in London and latterly in Birmingham as well, who in turn subcontracted or pieced out the individual components all the way down to screws and sidenails. The completed arms, or sometimes just the components, were then delivered to the Board of Ordnance at the Tower of London, which was responsible for placing the orders and for carrying out proof-testing and other quality-control checks upon delivery.



The flintlock mechanism

The half-cock position (1) was used for carrying and handling loaded muskets. For the sake of clarity the bridle, which would otherwise obscure the tumbler (A), has been omitted. Note how the sear (B) is engaged in the lower, rebated, slot at the bottom of the tumbler, very effectively locking it in place. To fire, the cock (C) was drawn back into the fully cocked position (2); the tumbler fixed to it was slightly rotated in a clockwise direction so that the sear was now engaging the upper slot, which was not rebated. Upward pressure on the sear by the

trigger (D) would thus release the tumbler. With the tumbler released the powerful mainspring (E) pressed it down, rotating the cock forward (3) so that the flint (F) struck and threw forward the frizzen (G), creating at the same time a shower of sparks to ignite the powder in the priming pan.

In normal circumstances ignition was swift and sure, but there was then usually a slight delay between the firing of the priming charge and the main one in the barrel. It was this delay which the Revd Alexander Forsyth would successfully obviate by means of his percussion system.



The Land Pattern adopted in 1722 formed the basis for all subsequent British Army muskets up to the adoption of the Pattern 1853 Enfield. This particular example (above) from the Museum of Lancashire in Preston bears the signature of R. Watkin, a gunmaker active between 1710 and 1740, and like an identical piece in private hands has a 36in barrel rather than the 46in barrel of the Land Pattern, although the three ramrod pipes are positioned at the correct distances for the latter, suggesting that at some point in time the barrel was cut down in length, perhaps for use by light infantry. This particular weapon and its twin have the initials 'YC' stamped in the stock, which are conjectured to stand for York Castle. The heavy piece of brass furniture (below), known as the sideplate, housed the sidenails; these were large screws which passed transversely through the stock to secure the lock. (Lancashire Museums)

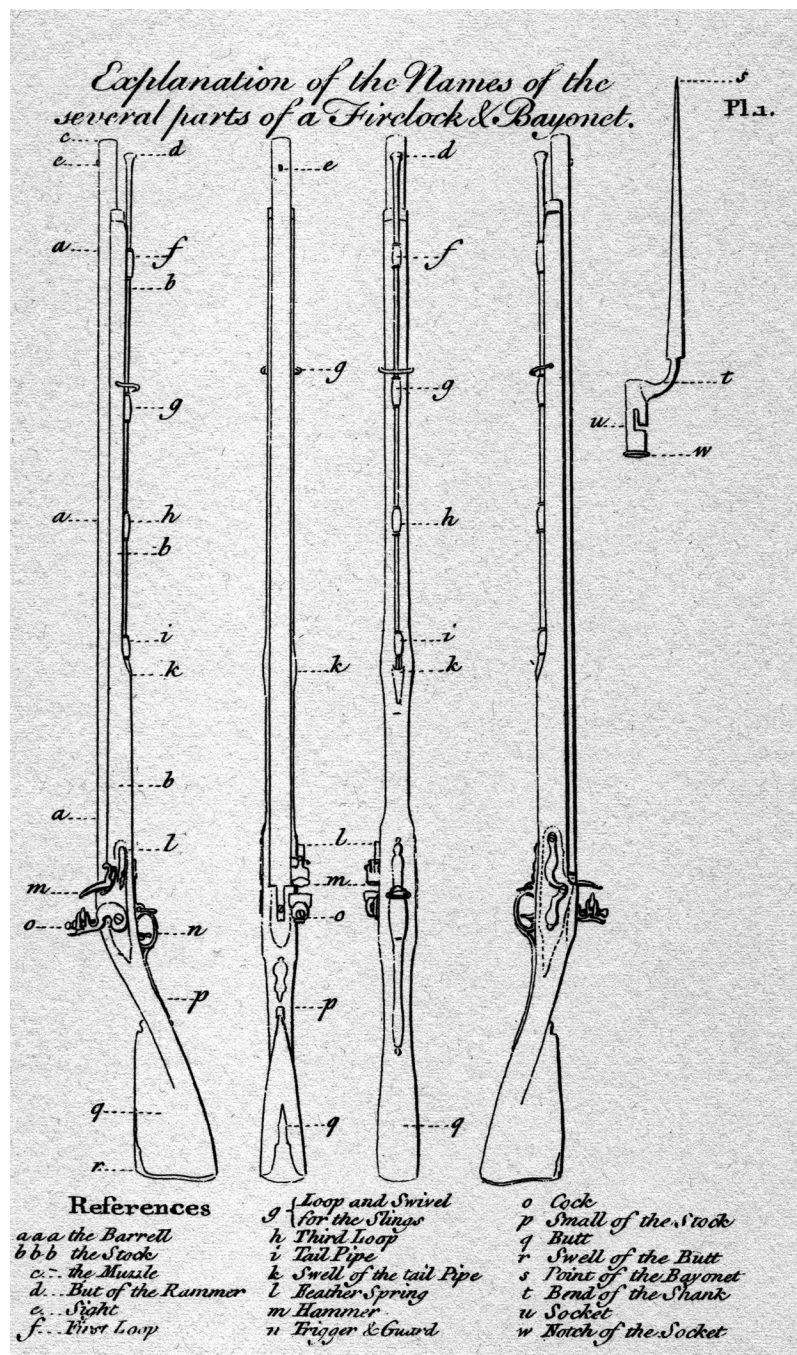
Both systems ensured a basic level of commonality – at least in terms of calibre and barrel length – but there was still scope for variation between manufacturers. However, after half a century of near-continuous warfare ended with the Peace of Utrecht in 1713, the French and British governments, in 1717 and 1722 respectively, took the opportunity to introduce a greater degree of standardization by laying down sealed or official patterns.

The form of the musket, as established by these patterns, followed two divergent paths. The barrel was set in a trough cut out of the top of the wooden stock, and originally secured by transverse pins passing through both the stock and metal loops brazed to the underside of the barrel. From at least 1716 onwards, however, external bands of iron or brass began to replace the pins on French muskets. This change offered a number of advantages in that the musket could be taken apart more easily for cleaning and repair and was also significantly lighter. The French *Modèle 1777*, for example, weighed 9.9lb while its direct British equivalent, the Short Land Pattern, although 2in shorter, weighed in at 10.5lb. Redesignated as the *Modèle 1777 corrigé en l'an IX*, or *An IX* for short, this particular musket not only served as the standard firearm



of Napoleon's army, but was also cloned for most German armies during the Napoleonic Wars (1803–15) and by the United States as the Model 1812/1816 Springfield.

Significant numbers of the *Modèle 1777*, originally ordered by the French Government, were even manufactured by British contractors in the 1790s and instead issued to Allied troops and auxiliary units. Otherwise all British flintlock muskets continued to follow the older



A contemporary explanatory drawing naming the parts of the 18th-century British Army flintlock musket, seemingly first published in William Windham's influential *A Plan of Discipline, Composed for the Use of the Militia of the County of Norfolk* (London, 1759).

Notwithstanding the association with militia, the weapon used as a pattern appears to be the regular Army issue Land Pattern, popularly known as the Brown Bess. The origin of the term is obscure and Victorian suggestions that it was a reference to Good Queen Bess (Elizabeth I of England) are fanciful. Most likely it derives from the German *Büchse* or gun and dates from the Continental wars against Louis XIV of France in the 1690s and early 1700s, when flintlock muskets finally replaced matchlocks. The term was certainly in use by way of British soldiers' slang in the 18th century, much as more modern soldiers still refer to their rifle by the old Anglo-Indian slang term 'bundhook' – or at least still did in the author's day.

The Short Land Pattern differed from the earlier, original Land Pattern in having a slightly more refined lock and a shorter barrel. Officially the barrel was 42in long, but this example (below) from the Museum of Lancashire has a barrel length of 38in. There were at least three generations of the Whateley family engaged in various aspects of the Birmingham gun trade up until the 1790s, and the crown and cypher mark indicates that this weapon was set up to a government contract. The escutcheon plate (below right) set into the neck of the stock primarily served as an anchor point for a transverse screw securing the rear of the trigger-guard – necessary because of the strain imposed on it by the rear sling-swivel. It was also an obvious location for engraved decoration or badges. In this instance it appears to identify a Lancashire Volunteer unit of 1798. (Lancashire Museums)

styling, with pins securing the barrel to a heavier and sturdier stock. In fact, it was not until the adoption of the Pattern 1853 Enfield rifle-musket that the switch was made to the use of external bands.

It should be emphasized that the dates of adoption in the accompanying table relate only to when a particular model was first approved, rather than when it was actually taken into service with front-line units. For a fortunate few this might have occurred quite quickly, but as a general rule of thumb the service life of a musket was reckoned, in the British Army at least, to be about 12 years, and new muskets would normally only be issued as and when required. A particular case in point is the New Land Pattern musket. This was approved in the spring of 1802, but production had barely begun when it was temporarily halted in May 1803 upon the renewed outbreak of war with France. Some 20,000 examples of the light-infantry variant were ordered to be set up in 1811 for eventual issue to those regiments so designated, but only the Foot Guards and the 4th Regiment of Foot had received the ordinary version before Waterloo! Consequently, the British Army actually fought its way through the Napoleonic Wars with the existing Short Land Pattern and India Pattern muskets, rather than with the more modern 1802 New Land Pattern. Conversely, the India Pattern had originally been set up for the East India Company as long ago as 1771; it was routinely issued to British regular troops serving there long before the first Government purchases in 1793 and thereafter survived in service long enough to be converted into a percussion weapon in the 1840s.



BRITISH, FRENCH AND AMERICAN MUSKET VARIANTS

The principal variants of British, French and American military smooth-bored flintlocks are set out in the table below. The table is obviously far from comprehensive, and excludes rifled weapons of all kinds and minor variants, together with specialized classes such as the Sea Service muskets produced for Britain's Royal Navy and also a confusing variety of regimental-pattern cavalry carbines. However, for the sake of comparison it does include a representative sample of those pattern flintlocks used by certain other countries.

DESIGNATION	COUNTRY	ADOPTED	CALIBRE	BARREL LENGTH	TOTAL LENGTH
Modèle 1716 (Marine contract)	France	1716	.69	47in	62.5in
Modèle 1717	France	1717	.69	46in	62in
(Long) Land Pattern	Britain	1722	.75	46in	62in
Short Land Pattern (Dragoons)	Britain	1722	.75	42in	58in
Ordinäre Flinte	Austria	1722	.72	46in	62in
M1723	Prussia	1723	.72	45in	60in
Modèle 1728	France	1728	.69	46in	62in
Modèle 1729 (Marine contract)	France	1729	.69	44.5in	61in
M1740	Prussia	1740	.72	41.25in	56.5in
M1752	Spain	1752	.69	41in	57.5in
Ordinäre Commiss-Flinte	Austria	1754	.72	44in	59.5in
Light Dragoon carbine	Britain	1756	.68	36in	52in
Artillery carbine	Britain	1757	.68	42in	58in
Militia Pattern	Britain	1757	.75	42in	58in
Modèle 1763	France	1763	.69	44in	60in
Modèle 1763 (cavalry)	France	1763	.69	34in	50in
Short Land Pattern (infantry)	Britain	1768	.75	42in	58in
East India Company contract	Britain	1771	.75	39in	55in
Elliot carbine (Light Dragoons)	Britain	1773	.66	28in	43.5in
Modèle 1777	France	1777	.69	44in	60in
Modèle 1777 (Artillery)	France	1777	.69	36in	51in
Modèle 1777 (Dragoons)	France	1777	.69	42in	57in
Modèle 1777 carbine	France	1777	.69	30in	45in
Model 1795 (Springfield)*	USA	1795	.69	44in	60in
Model 1795 (Harpers Ferry)	USA	1801	.69	42in	58in
Heavy Dragoon carbine	Britain	1796	.75	26in	42in
India Pattern (Army)**	Britain	1797	.75	39in	55in
New Land Pattern	Britain	1802	.75	42in	58in
New Land Pattern (Light Infantry)	Britain	1803	.75	39in	55in
M1809	Prussia	1809	.72	41.25	56.5in
Paget carbine (light cavalry)	Britain	1812	.66	16in	31.5in
Model 1816 (Springfield)***	USA	1816	.69	42in	58in

*A copy of the French Modèle 1763.

**This was exactly the same weapon first set up for the East India Company in 1771 and which continued to be manufactured until 1839.

***A copy of the French Modèle 1777.



The India Pattern was based on the Land Pattern series, but had a 39in barrel and simplified furniture. This particular example has a lock marked up to Ketland & Co., active in Birmingham from c.1809 (formerly William Ketland of Steelhouse Lane), and was probably manufactured around that date as it still has the older swan-neck cock. This would appear to be a hybrid private-

contract weapon, perhaps for a local militia unit, as it does not bear a crown and cypher and has the 42in barrel of the Short Land Pattern. Note the brass forend cap (left) protecting the end of the stock and the 'trumpet'-shaped ramrod pipe (at the muzzle end only) accommodating the iron ramrod. Note also the stud brazed on top of the barrel, not primarily as a front sight but a means of securing the bayonet. (Lancashire Museums)

CALIBRE

When first introduced in the latter part of the 16th century the musket was distinguished from other military firearms not only by its longer barrel, but also by its calibre, which was at first of 12 bore; i.e. 12 spherical bullets of the appropriate size could be cast from the 1lb weight of lead which, together with the 1lb of gunpowder and 1lb of slow-match, represented the usual ammunition scale of the day. Not surprisingly this, together with a long barrel, resulted in a comparatively heavy weapon, typically weighing some 14lb, which normally required a *fourchette*, or forked staff, upon which to rest it when firing.

In the French service, by the second half of the 17th century, the smaller and lighter 14 bore or .69 calibre was preferred since it did not require the use of a rest, and for convenience the same calibre was also used for cavalry weapons and other specialist variants. This happy standardization was in marked contrast to British service, where the calibre remained the same but the barrel length was reduced from 54in to 48in in 1628 and then to 46in by 1722 for infantry muskets. Having established that calibre for infantry muskets, there remained a rather confusing multiplicity of calibres for other weapons. Throughout most of the 18th century, for example, ordinary regiments of British dragoons, still being regarded as mounted infantry, carried .75-calibre infantry muskets, distinguished only by a very slightly shorter barrel. Indeed, it was largely exactly the same weapon which was adopted by the British infantry in 1768 as the Short Land Pattern. In 1796 it was



Flintlock ammunition

Gunpowder or black powder is a mixture of sulphur, saltpetre (ammonium nitrate) and charcoal. In general terms, the efficiency of the gunpowder is determined by the strength of the saltpetre and the degree to which it is adulterated with charcoal. Ideally it should comprise 75 per cent saltpetre, 15 per cent charcoal and 10 per cent sulphur, but this mix was not always achieved.

Sulphur is a naturally occurring substance almost exclusively found in volcanic regions. In Europe production was largely centred in Sicily, but in the 18th century Britain was able to import significant quantities through the agency of its increasingly important East India Company. Similarly, Britain also enjoyed virtually unlimited access to cheap, good-quality saltpetre from India. British gunpowder was therefore consistently admired as being very good indeed. The supply of saltpetre in France, on the other hand, was much less certain and required the licensing of contractors to dig it from below outhouses and stables – an unpopular process that was often destructive of the buildings concerned. The quantity and quality suffered accordingly and as a result, French gunpowder was not only reckoned less powerful but produced more residues with which to clog both barrel and mechanism. The establishment of a Gunpowder Commission in 1775 went some way to alleviating this, but more effective still was the devising of an artificial process (first seen in Prussia) called Putrefaction, which quite literally involved the decomposition of animal and vegetable matter by a process of fermentation in what were termed *nitrières* or *salpêtrières*.

Charcoal (usually willow charcoal) was the easiest and cheapest of the three ingredients to obtain, and consequently there was sometimes a tendency to adulterate gunpowder with too much of it. Mexican gunpowder encountered during the Texas Revolution in 1835–36 and the US–Mexican War in 1846–48 was judged to be

very poor stuff and dismissed by one Texian observer as ‘little better than pounded charcoal’ (quoted in Hardin 1994: 34).

In gunpowder’s earliest form, each of the three ingredients was ground to a dust or flour-like consistency before mixing. Known as Serpentine powder, this suffered from two crucial weaknesses. First, it did not travel well and there was a marked tendency for the different ingredients to separate out. This could be rectified to a degree by stirring it all together again immediately before use, but a greater problem was that the density of the fine powder and the resultant lack of oxygen inhibited combustion. The solution to both problems was to bind together the ingredients first with water and later with distilled spirits to form a paste which was then compressed, dried and finally ‘corned’ in a mill to produce consistently sized granules.

Propelled by 70 grains (4.5g) of good-quality powder, the .71 soft lead ball was a potent man-stopper with the potential to shatter large bones. All too often, however, that lethal potential fell away dramatically if the powder was damp or of poor quality; instead of a penetrating wound a contusion was a more common outcome, and a ‘spent’ ball might even bounce off thick clothing. ‘Double-shotting’ a weapon – i.e. stuffing two balls rather than one into the barrel – could obviously increase the lethality, but due to the time required in doing so this was only practical before going into battle. Otherwise, the only significant ammunition variants were the use of ‘small shot’ or buckshot in the manner of a shotgun, although this was rarely issued as a military round, unlike the peculiarly American practice of using the so-called ‘buck and ball round’. The latter, as the name suggests, was a round of ammunition combining an ordinary musket ball with three or four buckshot. In either case the buckshot did little to increase the initial lethality of the round, but it obviously complicated the wound and increased the likelihood of infection.



LEFT A ‘pebble’, or flint, is shown alongside original .71 balls for British Land Pattern muskets of .75 calibre. This shard of quartz, usually measuring about 0.75–1.2in square, was knapped or shaped by striking flakes off to create a wedge shape with a sharp cutting edge which would strike sparks off hardened surfaces such as steel. Without it, the flintlock musket was useless.

replaced by a much handier short-barrelled carbine, but the calibre remained the same: .75. Other British cavalry also carried short carbines; sometimes of individual regimental patterns and of varying barrel lengths, but this time usually – though not invariably – in .65 calibre.

However, carbines were by no means restricted to cavalry use. While the term is now exclusively applied to short-barrelled weapons, it could also be used at the time to denote almost any small-calibre firearm irrespective of barrel length. In 1758, for example, a carbine was issued to a variety of light-infantry and Highland regiments and independent companies. At first glance there was nothing to distinguish this carbine from an ordinary infantry or dragoon musket, for it had a 42in barrel. However, not only was it of a smaller .68 calibre (effectively the same as the French Army musket), but it weighed only 7.75lb, in contrast to the 10.5lb of the similarly dimensioned Short Land Pattern. At various times similar carbines were also set up for sergeants and cadets, but in recognition of the potential for confusion, they were often designated as fusils.

As if the multiplicity of calibres was not confusing enough, most musket balls were actually cast smaller than the notional calibre of the musket in order to ensure that they could easily roll into the barrel, even if it was heavily fouled. Consequently, British muskets with a calibre of .75 in fact fired a .71 ball. There was a decided (if not entirely warranted) feeling amongst some British commentators that their heavier .71-calibre bullet gave them an edge over the French in combat. As long ago as the battle of Malplaquet (11 September 1709), for instance, Captain Robert Parker opined after a firefight between the Royal Irish Regiment and the Royal Regiment of Ireland in the French service that: ‘The advantage on our side will be easily accounted for, first from the weight of our ball; for the *French* Arms carry bullets of 24 to the pound; whereas [*sic*] our *British* Firelocks carry ball of 16 only to the pound, which will make a considerable difference in the execution’ (Parker 1968: 88–89). In reality, the difference between the individual rounds probably had rather more to do with the quality of the gunpowder used than the slight difference in the weight of the ball.

MUSKET ACCESSORIES

Accoutrements

Until late in the 17th century, musketeers carried pre-measured charges of gunpowder in a series of wooden or tin bottles suspended from a leather bandolier. Ideally, the number of bottles or ‘boxes’ corresponded to the calibre of the weapon. Thus the original 12-bore muskets required 12 bottles or boxes of powder for the 12 bullets carried separately in a small bag or even in the soldier’s pockets, plus an additional box for priming powder. However, more or less coincidentally with the widespread introduction of the flintlock, the pre-packed paper cartridge began to

replace the inconvenient bandolier. As early as 1644 an English writer named John Vernon described in *The Young Horseman* how

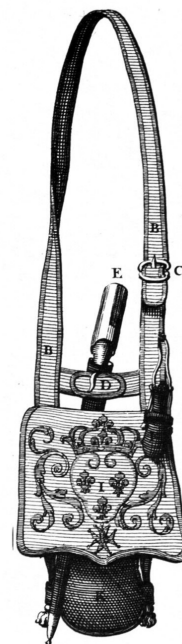
if you use Cartrages, you shall finde in your Carttreg case a turned wooden pin which you must take, having cut lengths of white paper something broader then the pin is in length, and rowle the paper on the pin, then twist one end of the paper, and file it almost full of powder, then put the bullet on top of the powder, twisting that end also. (Vernon 1644: 10)

Vernon's book was aimed at cavalrymen, as its title suggests, but infantry too were soon using such cartridges. In either event, the introduction of cartridges was a staged process in which, at first, the powder and bullets were still carried separately, but eventually both were combined in a single package – albeit, in the case of the French Army, not until as late as 1720.

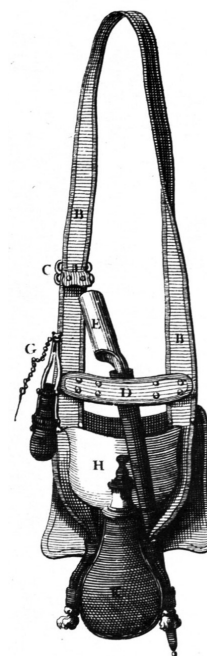
The adoption of cartridges greatly simplified the provision, transportation and carrying of small-arms ammunition. As early as the mid-1640s, musketeers in the English Royalist army were being issued with 'powder bags' rather than bandoliers. No illustrations survive, but as they were furnished with a girdle or waist-belt they were presumably not unlike the French *gargousier* or belly box. A quantity of cartouche or cartridge boxes of tin covered in leather were certainly ordered for the New-Modelled Parliamentarian Army in 1645, and a 1662 order for the Battle-Axe Guards of Ireland specified that theirs were to be 'Tyn Cartouch boxes covered with Leather of Calves Skin for Muskets with Formers, prying boxes and neate [ox] leather girdles' (quoted in Blackmore 1994: 30).

The capacity of these belly boxes was obviously quite limited, and in the French service at least the paper cartridges were supplemented by a largish *poire à poudre*, or powder flask, made of leather or horn. This was slung on the right hip together with the ball bag and a small priming flask. It was not until about 1730 that this arrangement was replaced on the hip by the more familiar *giberne*, or cartridge box. Similarly, in Britain, adoption of a proper cartridge box had come much earlier, but again the capacity of the box had been surprisingly limited, requiring it to be supplemented by expedients such as a belly box worn on a belt around the waist or by a tin 'magazine' clipped to the sling. In the end the cartridge box itself was enlarged. The wooden block was replaced by tin compartments and the capacity (for British ones at least) increased to as much as 60 rounds.

Even then, battlefield resupply was sometimes necessary. In the early days powder was transported in bulk by the barrel, and resupply during an engagement required a soldier to scoop loose powder from the barrel into his empty chargers. This was a process fraught with danger as several soldiers jostled together at the same time, and if one of them in his haste forgot that he was carrying a lighted slow-match, the result could be unfortunate. Cartridges, on the other hand, could be packed in barrels or boxes for transportation and then delivered straight to the firing line using improvised carrying parties. After the campaign in Flanders in 1794, one British officer recorded:



French infantry equipment, 1697. (B) is the belt; (C) is the buckle; (D) is the bayonet frog; (E) is the socket bayonet; (F) is the priming flask; (G) is the picker, for cleaning out the touch-hole; (H) is the bullet bag; (I) is the protective flap; and (K) is the powder flask or *poire à poudre*.



It would be doing a great injustice to the women of the army not to mention with what alacrity they contributed all the assistance in their power to the soldiers while engaged, some fetching their aprons full of cartridges from the ammunition wagons, and filling the pouches of the soldiers, at the hazard of their own lives, while others with a canteen filled with spirit and water, would hold it up to the mouths of the soldiers, half choked with gunpowder and thirst ... (Quoted in Lawson 1961 III:107)

Just how widespread this particular expedient might have been is difficult to say, although it was clearly managed with the active co-operation of the quartermaster sergeants, and similar stories come from both the French and American armies.

Whether the cartridges or packets of cartridges were carried up to the firing line by soldiers detailed for the purpose or by non-combatants such as soldiers' wives, the essential point is that the near-simultaneous adoption of the flintlock musket and the paper cartridge meant that the soldier not only had a simple, robust weapon which could be fired more quickly, more reliably and more effectively than before, but also a new type of ammunition which could support that increased firepower.

Bayonets

In addition, the soldier also had a bayonet. The term apparently dates back to at least the latter part of the 16th century and was originally applied to a type of long-bladed hunting knife or dagger, similar to the German *Hirschfänger* and seemingly made in the French city of Bayonne, near the foot of the Pyrenees. As firearms came to supersede the more traditional crossbow for hunting, the utility of jamming the *bayonette* into the muzzle to convert the musket instantly into a boar-spear soon became apparent. The process by which this hunting weapon became a military one is easily explained.

As noted earlier, in the early 17th century matchlocks accounted for the overwhelming majority of military muskets, with the technically more complicated and expensive flintlock largely restricted to specialist companies of 'Firelocks'. These small units sometimes had a semi-ceremonial role as lifeguard or bodyguard units attached to a particular officer, e.g. Prince Rupert's Firelocks during the early part of the English Civil War (1642–51), or the Battle-Axe Guards of Ireland, or alternatively they might be employed to guard the artillery train. However, other companies were used as scouts and skirmishers and quite naturally, like 18th-century German *Jäger*, these were often recruited from among foresters, gamekeepers and huntsmen. Equally naturally, those recruited in the Pyrenean foothills for the French Army brought their bayonets with them, and the practice soon spread. As the various companies and eventually whole regiments of men armed with firelocks were not mixed with pikemen, there was a clear need for some means of defending themselves against direct assault, especially by cavalry, and the bayonet readily presented the answer.



A grenadier of Britain's Coldstream Guards is a little uncertainly depicted in this watercolour by C.J. Lyall (1845–1920). Supposedly representing a soldier at the time of their introduction into the regiment in 1670, the uniform depicted probably dates from about ten years later. As was customary at the time, as a grenadier this man's coat is extravagantly decorated with loops and tassels, and the once practical nature of the forage cap, which later evolved into the famous mitre cap, can easily be appreciated. Of most interest, however, is the plug bayonet. Although depicted over-scale, its origin as a dagger, complete with cross-guard, is readily apparent. Examples exist of flintlock muskets with slightly belled muzzles, opened out specifically for the purpose of accommodating plug bayonets. Needless to say, such muskets could only be altered to accommodate the later socket bayonets by shortening the barrel in order to remove the belled muzzle entirely. (Anne S.K. Brown Military Collection, Brown University Library)

Both these bayonets are British; the upper one was made by John Gill in Birmingham sometime between 1805 and 1817, and the lower one by J. or Wm. Makin in London between 1800 and 1820. Note how the triangular blade is not only offset from the socket slotting on to the muzzle in order to allow the musket to be fired while the bayonet is fixed, but is also angled away to make reloading the musket easier. The mortised socket, although simple, was far from secure, and a variety of locking devices were devised. In the case of the lower example, the collar has been removed, probably sometime after October 1844, and replaced by another, now lost, that was adapted to fit a spring catch underneath the barrel of the musket.



The earliest reference to such weapons in the British service appears to come in March 1663, when included amongst the equipment back-loaded after the abandonment of Dunkirk were 500 'short swords or Byonetts' (quoted in Blackmore 1994: 31). The use to which they had been put is not clear, and they may indeed have been in store there when the English took over the place five years earlier. Whatever the explanation, bayonets were certainly issued to a regiment of fusiliers raised in France in 1671 and to a regiment of dragoons raised in England in the following year, while the Royal Regiment of Fusiliers had them when first raised in 1685. The significance in all three cases is that the rank and file in question were all armed with flintlocks. At much the same time, grenadier companies were being added to ordinary infantry regiments and they, too, had flintlocks and bayonets.



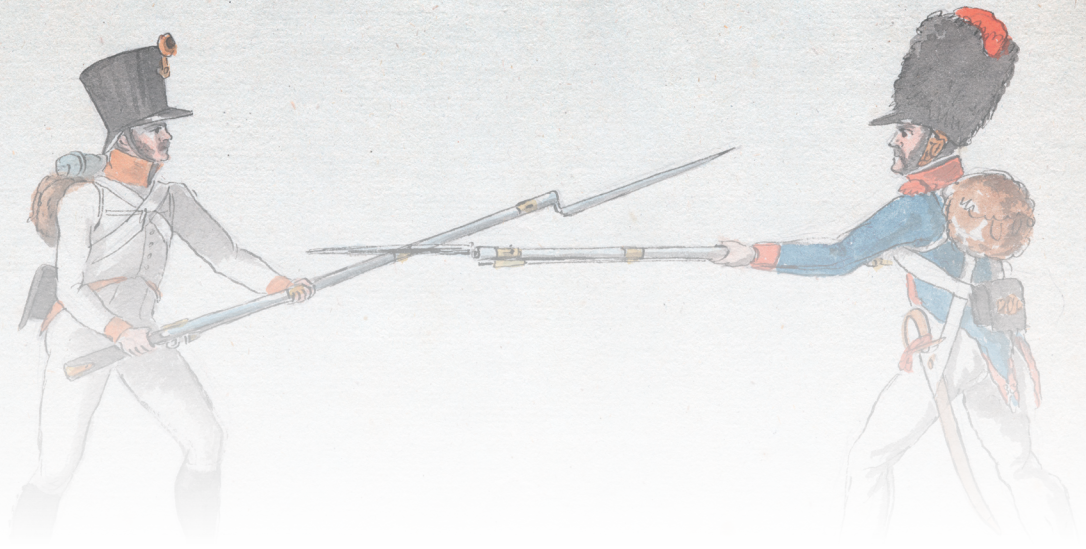
All of these early bayonets were still of the plug type, jammed into the muzzle of the musket; indeed, for a time some muskets were made with slightly flared barrels the better to accommodate them. While no-one doubted the utility of the bayonet, there was an obvious problem in that once the barrel was plugged the musket could not be fired. A variety of solutions were attempted, generally using rings to attach the bayonet to the side of the barrel, but in the 1690s the first socket bayonets were introduced. The handle was replaced by an iron tube, attached to the blade by a cranked shaft, which slipped over the end of the barrel. In order to accommodate and secure the tube, the wooden stock was shortened accordingly and a substantial stud or lug brazed to the barrel just short of the muzzle. A mortised slot cut out of the tube then engaged with the lug to secure it on to the barrel. By 1702, the French Army was equipped with socket bayonets. The British Board of Ordnance purchased huge numbers of plug bayonets between 1689 and 1703, and no mention is made of socket bayonets until an order placed in August 1703.

The musket could now be loaded and fired with the bayonet fixed, at which point it was realized that the balance of the musket was adversely affected. This particular issue was partially addressed by altering the shape of the blade – replacing the original flat dagger with a lighter triangular spike with deep fullers in the two outer faces, while the inner face was angled away from the muzzle to facilitate reloading. Triangular blades appeared on plug bayonets of the late 17th century, but were not adopted by Britain until c.1715; their superior strength was well known from their use on smallswords of the period.

Not surprisingly, there were a number of variations on this basic pattern over the life of the flintlock musket, the most bizarre being the kukri-bladed version carried by some early Gurkha units in the 1820s and 1830s. Fundamentally, however, except for the addition of a variety of locking devices, this basic form eventually carried the bayonet long beyond the life of the flintlock.

Slings

One further and easily overlooked accessory remains to be described in brief – the carrying sling. The first reference to it appears to come in Johann Jacobi von Wallhausen's *Kriegskunst zu Pferd* of 1616, in which mounted dragoons are depicted with muskets slung on their backs. Significantly, the sling resurfaced in the second half of the century with the advent of the hand grenade, used in the siege warfare which then dominated military operations in Europe. As with the early dragoons, the sling was required in order for the musket to be carried on the soldier's back while leaving both hands free. Although the tossing of hand grenades soon went out of fashion the sling did not, and the tanned- or buff-leather strap became a standard attachment to all flintlock muskets. Notwithstanding its simplicity, it was a significant development which enhanced the individual soldier's versatility, allowing him to march further and faster, especially in difficult terrain, and was thus the final link in the process by which the flintlock musket created the universal soldier.



USE

The search for a tactical doctrine

SUPPLANTING THE PIKE AND MATCHLOCK

At the time of the flintlock musket's introduction, most infantry regiments were still combined-arms units, comprising both musketeers *and* pikemen. Of the two the 'puissant pike' was originally regarded as the more important arm, whether in attack or defence, but by the 17th century its status was sharply in decline in relation to the matchlock musket. As late as the 1650s the official ratio in most European armies was two musketeers to each pikeman, but in practice the true proportion of musketeers was generally much higher. It was becoming increasingly difficult to recruit and more importantly retain pikemen, far less persuade them to wear the necessary armour. 'Cabinet practitioners', or armchair theorists, were still

This splendid detail from a hand-coloured etching by Romeyn de Hooghe (c.1645–1708) depicts a rather fanciful scene purporting to represent the siege of Londonderry by King James II's forces in 1688–89. Although generic in nature, it nevertheless provides a very useful illustration of infantrymen in action during the transitional period when the matchlock musket was in the process of being supplanted by the flintlock and the pike was being replaced by both. Note the way in which the musketeers are still leaning well forward, as in the days when the musket was fired supported by a staff or *fourchette* and how, notwithstanding there being very few pikes, the cavalry are returning fire with their flintlock pistols and carbines rather than attempting to charge home with their swords. (Anne S.K. Brown Military Collection, Brown University Library)



fond of lauding the pike as the more honourable weapon and one fit to be carried by gentlemen. The more practical, including some senior officers, regarded the pike as a very poor substitute for a musket, especially as increasing numbers of flintlocks became available.

Eventually, the French minister of war, the Marquis de Louvois, complained in 1670 that 'there are hardly any pikes in the companies and most of the soldiers take it upon themselves to carry fusils' (quoted in Houlding 1988: 8). This situation was officially recognized in 1677 when the ratio of muskets to pikes in the French Army was increased (on paper at least) to 3:1, and then again in 1688 to 4:1. It was a similar story elsewhere. In Scotland, for example, an independent company of grenadiers commanded by the Earl of Mar was expanded into a marching regiment of foot in 1678 and received 548 muskets and 272 pikes for the purpose, broadly conforming to the old 2:1 ratio. Barely eight years later, however, in 1686, the Scots Guards had an establishment of 80 musketeers and only 20 pikemen in each company. A temporary shortage of muskets necessarily saw a rather higher proportion of pikes issued to some newly raised regiments during the crisis of 1689, but others fared better. While Lord Blantyre's Regiment mustered 480 musketeers to 150 pikemen (slightly better than 3:1), all 600 of the Laird of Grant's men were equipped with flintlock muskets. By that time it was very obviously a losing battle, for the fewer the number of pikemen the less effective they pretended to be, even when fighting defensively. Grant's Regiment was entirely typical of its time,



This very attractive engraving by Dirk Maes (1656–1717) depicts a typical musketeer of the Thirty Years' War period (1619–48). He is armed with a lightweight matchlock caliver of the type that evolved in the second half of the 17th century into the flintlock fusil, which was favoured by French infantrymen from the days of the great Maréchal Turenne and afterwards formed the basis of the very influential Charleville series of muskets. (Anne S.K. Brown Military Collection, Brown University Library)

and while the pike was not officially abolished in Spain and France until 1702 and 1703 respectively, and in Britain in 1707, it had in reality long since disappeared from the battlefield except in the further reaches of Eastern Europe, such as in Russia and along the Turkish frontier.

The matchlock musket clung on just a little longer, however. Arms allocated for an expedition to Virginia in 1676 had included 300 matchlocks and 200 flintlocks, while 1,000 matchlocks and 700 flintlocks were shipped to the British garrison of Tangier four years later. Shortly after coming to the throne in 1685, however, King James II ordered that flintlocks should be substituted for matchlocks just as quickly as funds allowed. Likewise, in 1689, when contracts were being placed with the Birmingham gunmakers for the first time, all were for flintlocks. Although existing stocks of the matchlock obviously continued in service for some years afterwards, officers were increasingly reluctant to accept them, especially in substitution for pikes. Only flintlocks would do – and of the latest pattern at that. Even in the colonies, governors were decidedly unappreciative of the Board of Ordnance's attempts to offload obsolete stock, and in 1705 the Governor of the Leeward Islands tartly protested that the matchlocks lately received were 'dangerous in marches through a Country full of Sugar Canes'; bowing to the inevitable, 500 new flintlocks were sent out in the following year (Blackmore 1994: 38). On the Continent, the matchlock lingered only a little longer. The Dutch had seemingly abandoned it by 1692, and the last of them were withdrawn from French front-line units in 1708 and from Austrian ones in 1710.

In a very real sense the 18th century was to be the century of the flintlock, carried not by a chosen few specialists but by all European soldiers and a good many others besides. To understand why the flintlock should be regarded on all sides as so indispensable, it is necessary to begin by looking at its actual effectiveness in both theory and practice – and its supposed limitations.

FLINTLOCK EFFECTIVENESS

Loading and firing

The ubiquity and indeed the very real popularity of the flintlock musket might at first sight seem surprising, because it is popularly characterized as being heavy, clumsy, slow to reload and hopelessly inaccurate. The reality was rather different. Unlike the early matchlocks, the flintlock was not exceptionally heavy by any measure. The typical India Pattern and Modèle 1777 muskets of the Napoleonic Wars weighed 9.11lb and 9.92lb respectively, and were therefore only slightly heavier than the (unloaded) 8.82lb of the later Lee-Enfield rifle and directly comparable with the modern FN/FAL and AK-47 assault rifles, both of which weigh 9.48lb when a full magazine is fitted. Furthermore, both the India Pattern and Modèle 1777 muskets are also rather *lighter* than the vaunted M1 Garand and M14 rifles, weighing in at 11.68lb and 11.46lb respectively.



Musketeers of the late 16th century, by the Dutch artist Jacob de Gheyn II. Note the excessive clutter of equipment required to service the heavy matchlock musket, including the staff or *fourchette* required to rest it on when firing. (Anne S.K. Brown Military Collection, Brown University Library)

Then again, the comparatively long barrel of the infantry flintlock might at first sight seem to be awkward for loading, but when doing so the musket was generally angled so that the muzzle was only a little more than chest-high. Moreover, the manual exercise, or weapon-handling drill, first introduced by Prince Johan of Nassau in the 16th century was a means not just of teaching a soldier how to carry, load and fire his musket; through constant practice of that exercise it was also intended to inculcate an easy dexterity in handling the weapon. In 1607, the Dutch artist Jacob de Gheyn II had created a superb set of engravings illustrating Nassau's manual exercise, and subsequently a long line of other artists depicted successive variations and improvements well into the 19th century. The artistic quality rarely matched that of Jacob de Gheyn II's original engravings, but what all of them had in common was that they more or less meticulously depicted each individual step of the process.

To load the flintlock musket it was first necessary to balance it in the left hand, half-cock it and open the priming pan with the right hand, and then take out a cartridge. This was bitten open and a small quantity of powder sprinkled into the pan, which was then closed and the musket 'cast about' and held on the left side at such an angle as to lower the muzzle to chest height, this being convenient to pour the remainder of the powder down the barrel and stuff the ball and cartridge paper after it. The paper normally served as wadding and helped reduce windage, i.e. the gap between the diameter of the ball and the internal diameter of the barrel.

Ordinarily, the ramrod was used to tamp down the charge solidly; but soldiers proceeding on sentry or other duties requiring loaded weapons, though with no certainty of firing them, would load a 'running ball' – that is, simply drop the ball down the barrel without any wadding or ramming of the charge, so that when coming off duty they could unload the weapon simply by upending it. Similarly, a widely used expedient in combat was to strike the butt end on the ground and rely on the weight of the ball to



Drilling with the flintlock musket

This sequence of photographs illustrates the British *Manual Exercise 1764* as used during the American Revolutionary War (1775–83) and afterwards. Obviously, there were variations from army to army and over time, but none were of any real substance, and this 35-stage sequence is entirely typical.

In the 'Position of a soldier under arms' (1) the soldier was enjoined to 'stand straight and firm upon his legs; Head turned to the Right; Heels close; Toes a little turned out; the Belly drawn in a little, but without constraint; the breast a little projected; Shoulders square to the front, and kept back; the right Hand hanging straight down the side, with the Palm close to the thigh; the left elbow not to be turned out from the body; the firelock to be carried on the left Shoulder, as low down as can be admitted without constraint; the three last Fingers under the Butt; the fore Finger and thumb before the Swell; the Flat of the Butt to be supported against the hip-bone, and to be pressed so that the firelock may be felt against the left side, and that it may stand before the Hollow of the Shoulder, not leaning towards the head nor from it; the barrel almost perpendicular.'

'I. Poise your Firelocks!' (2): the soldier grasps the neck of the stock with his right hand and holds it up directly in front. The left hand initially slaps against the swell of the stock. In 'II. Cock your Firelocks!' (3), the left hand now holds the stock while the right hand cocks the weapon. This is followed by 'III. Present!' (4) and 'IV. Fire!': note how the soldier's weight is placed on his left foot, while the musket itself is supported at the swell of the stock.

'V. Half Cock your firelocks!' (5) is followed by 'VI. Handle your Cartridge!' (6) and then 'VII. Prime!' (7); the cartridge is bitten open and a small quantity of powder is sprinkled into the priming pan. Then 'VIII. Shut your Pans!': the soldier is instructed to 'shut your pan briskly, drawing the right arm at this Motion towards your Body, holding the Cartridge fast in your Hand ... Turn the Piece nimbly round to the loading position, with the Lock to the Front, and the Muzzle the Height of the chin, bringing the right hand behind the muzzle; both feet kept fast in this Motion'. 'IX. Charge with Cartridge!' (8) is followed by 'X. Draw your Rammers!' (9) and 'XI. Ram down your Cartridge!' (10). The next step is 'XII. Return your



Rammers!' (11): the soldier is commanded to 'Return the rammer, bringing up the piece with the left hand to the shoulder, seizing it with the right hand under the cock, keeping the left hand fast at the swell, turning the Body square to the Front'.

'XIII. Shoulder your Firelocks!' (12) is the 'under arms' position. This is followed by 'XIV. Rest your Firelocks!' (13) and then 'XV. Order your Firelocks!' (14), with 'XVI. Ground your Firelocks!', 'XVII. Take up your Firelocks!', 'XVIII. Rest your Firelocks!' and 'XIX. Shoulder your Firelocks!' after that. 'XX. Secure your Firelocks!' (15) is the posture adopted in heavy rain or other adverse weather in order to keep the lock dry within the soldier's armpit and prevent rainwater running down the barrel. For the same reason, the sling-swivels were so positioned that when slung, the musket would be carried with the butt up and muzzle down. It is followed by 'XXI. Shoulder your Firelocks!'

'XXII. Fix your Bayonets!' (16) is followed by 'XXIII. Shoulder your Firelocks!' and then 'XXIV. Present your Arms!' (17): this is the saluting posture. (A somewhat similar posture was adopted by the French infantry in advancing with the bayonet.) The next step is

'XXV. To the right Face!' followed by 'XXVI. To the Right Face!' and then 'XXVII. To the Right about Face!'. 'XXVIII. To the Left Face!' (18) is followed by 'XXIX. To the left Face!', 'XXX. To the left about Face!' and 'XXXI. Shoulder your Firelocks!'

'XXXII. Charge your Bayonets!' (19) sees the soldier instructed to 'Bring the Swell of the Firelock down strong upon the palm of the hand, turning upon both heels to the right, the right Hand grasping the Piece at the Small behind the Lock, and as high as the waist-belt: the firelock upon a level with the Barrel upwards'. It is followed by 'XXXIII. Shoulder your Firelocks!' in which the soldier is required to 'Bring the Firelock to the Shoulder, place the left hand upon the Butt, bringing the feet square to the Front'. In 'XXXIV. Advance your Arms!' (20) the soldier is ordered to 'Bring the Firelock down the right Side with the right Hand, as low as it will admit without Constraint, flipping up the left Hand at the same Time to the Swell, the Guard between the Thumb and fore Finger of the right Hand, the three last fingers under the cock, with the barrel to the rear'. It is followed by 'XXXV. Shoulder your Firelocks!'.

self-tamp it. In either event, at that point the musket was brought back to the shoulder, or directly to the 'recover' – held vertically in anticipation of the order to open fire.

As to the time required for the loading process, it is important to appreciate that those meticulously detailed illustrations of the manual exercise were intended for instructional purposes only. In basic training each and every individual step of the exercise was necessarily the subject of a separate spoken command. However, once the recruit had mastered the process it was speeded up considerably and the ponderous individual commands were replaced by just three: 'Make Ready!', which encompassed the whole of the loading process, including if necessary the locking of ranks; 'Present!', at which point the soldier cocked his musket and levelled it at the enemy; and 'Fire!' or 'Tirez!' (Pull!), as the case might be.

Following the widespread introduction of the iron ramrod in the 1730s, constant practice in this manual exercise could achieve a theoretical rate of fire of as many as four to five rounds a minute. Just as today, however, loading and firing too quickly was counter-productive and increased the natural tendency to fire high. Indeed, the all-too-common business of raw or over-excited troops 'shooting at the skies' was to be a constant theme throughout the life of the musket, from its very earliest days all the way up to the American Civil War (1861–65) and beyond. If anything, the effect of such wild (and consequently harmless) firing was to encourage rather than dismay those being shot at. Consequently, far from urging haste, officers were enjoined to steady and if necessary *slow* their men's rate of fire, ensuring in particular that they took the time to level their pieces properly before pulling the trigger.

2me feuille d'exercice de la charge en douze temps et dix huit mouvements, apparently intended as a very basic primer in the manual exercise – i.e. the loading and firing of the musket – during the French Revolutionary Wars (1792–1802). A startling variety of uniforms are depicted, and although most wear the 'National' uniform of a blue coat with red and white facings, the two figures wearing helmets may be wearing the old pre-Revolutionary *chasseur* or light-infantry uniform. Two others wearing a form of shako may also be intended as *tirailleurs* or sharpshooters, but it is equally possible that they are intended to represent volunteers of the Polish Legion. (Anne S.K. Brown Military Collection, Brown University Library)



Reliability

For the most part the flintlock was normally very reliable, and on pulling the trigger the soldier could reasonably expect it to fire. There were, nevertheless, a number of factors which could adversely affect that reliability, beginning with the flint, which might simply fail to strike sufficient sparks to ignite the priming charge. There were various reasons for this, not the least of which was the fact that the flint itself might be defective. It was generally held, for example, that while British gunpowder was accounted the best in the world, British flints were reckoned much inferior to French ones, and consequently they were often disparagingly referred to as 'pebbles'. Even if the flint was of good quality and properly 'knapped', or shaped, it would soon become blunted in use and require to be replaced after 10–15 firings.

The flintlock could also be adversely affected by the fact that black powder is extremely hygroscopic and will happily absorb moisture from the atmosphere. Unfortunately, even moderately damp powder, especially if of poor quality in the first place, will prove reluctant to ignite, and soon clog the barrel, touch-hole and priming pan, thus necessitating constant scouring to clear them. The problem became immeasurably more difficult, of course, when the flintlock was exposed to direct rainfall. Although the priming pan was normally accounted shower-proof, both flint and frizzen were less likely to produce the required shower of sparks if slicked by rain. However, at the battle of Culloden, after a blustery morning on 16 April 1746, Private Edward Linn reckoned that the Jacobites 'thought it was such a bad day that our firelocks would not fire, but scarce one in our regiment missed firing, but kept them dry with our coat laps' (quoted in Tomasson & Buist 1962: 175). Once an initial shot had been discharged, the barrel could generally be kept sufficiently warm and dry through constant firing, but heavy rain – especially if prolonged – was a different matter. Famously, at the battle of Fishing Creek on 19 January 1862, Confederate infantrymen, finding their flintlock muskets useless in the heavy rain, not only threw them away but smashed them against trees and fences to ensure they would not be gathered up and reissued. It should be emphasized, however, that this action was exceptional and related not just to the adverse weather but to the age of the weapons themselves.

During the 18th century the British Army reckoned, as a general rule of thumb, that the flintlock musket had a maximum useful life of about 12 years. This was far exceeded, however, by those weapons which performed so dismally at Fishing Creek, and scarcely less so by those carried by the Mexican Army in the 1840s. Over time, not only was there a tendency for the lock mechanism to become worn, sloppy and sometimes downright dangerous, but corrosion led to the touch-hole in the barrel opening out, thus leading to an alarming blow-back effect. Not only did this inhibit the soldier himself from holding the weapon anywhere near his face, but it also tended to scorch the man standing next to him. The understandable result was a pronounced tendency to fire the weapon from the hip, abandoning any pretence of taking aim. Nevertheless, in criticizing the behaviour of Mexican troops for doing so in the 1840s (and anyone else armed with rusty and worn-out cast-offs) it is extremely important to recognize that much of the supposed inadequacy of the flintlock derived from the lamentable condition of weapons purchased 20 or more years before, rather than any intrinsic defect in design.

Performance

While an individual musket ball might carry a good deal further, the absolute maximum useful range of the flintlock was generally held to be no more than about 300yd and in reality a good deal less. In 1755, for example, two companies of supposedly very highly trained Prussian grenadiers shot at a target 10 paces (8.33yd) broad and 10ft high, hitting it with 46 per cent of rounds fired at 150 paces (125yd) and 12.5 per cent of rounds fired at 300 paces (250yd). Similarly, a series of tests carried out in Britain by a King's German Legion officer named William Muller (or Mueller) about 50 years later recorded the percentages of hits scored by musket-armed soldiers against a comparable target. At 100yd, 40–53 per cent hits were achieved; at 200yd, this fell to 18–32 per cent; and at 300yd, only 15–23 per cent hits were recorded. In each case, the lower figure was seemingly achieved by 'ordinary soldiers' firing volleys on the word of command and the higher figure by 'well trained men'. In both the Prussian and British tests the 10ft-high target can hardly be regarded as realistic, even though Muller declared his version to represent a body of cavalry. Very few men are 6ft tall – let alone 10ft tall – and given the well-attested propensity of musket-armed soldiers to shoot high at the best of times, an uncomfortably high percentage of these hits would actually have gone over the heads of an enemy infantry company.

In France, on the other hand, Ernest Picard recorded only very slightly different results in 1800 against a smaller and more realistic target measuring just 5.75ft tall by 3.3yd wide. At 75m (82yd), 60 per cent hits were recorded; at 150m (164yd), 40 per cent hit the target; at 225m (246yd) the hit rate fell to only 25 per cent; and at 300m (328yd), 20 per cent. At even closer ranges the performance improved dramatically. In an informal modern test, utilizing upended wooden railway sleepers as targets, it was actually found to be difficult to *miss* at 25yd – double the range once recommended by Lieutenant-General Hawley!

In all three sets of historical trials there are variations in detail as a result of the different circumstances under which the tests were carried out and the size of the target at which the men were actually shooting. Nevertheless, it is very striking how abruptly the accuracy of the smooth-bored flintlock dropped off *beyond* 100yd. In simple terms, because the ball was not normally a perfect fit in the barrel, it tended to career from side to side and would often exit the barrel at an unpredictable angle. This could be prevented to a degree by patching the ball – wrapping it in cloth or cartridge paper to ensure a snug fit – but this was not always practical and was in any case impossible once the barrel started to clog with uneven patches of powder residue.

However, the figures both formal and informal quoted above were obviously obtained under test conditions. There were some dramatic exceptions, such as that 'perfect volley' delivered by Major-General Wolfe's men at Quebec in 1759, but a detailed analysis of a typical cross-section of actual engagements during the Napoleonic Wars demonstrates a much lower level of accuracy than the hit rate of 40–50 per cent or better recorded in those tests. Instead, 'at ranges of 100 yards or less over the full period of an engagement casualties were inflicted by just 5½% of the bullets ordered to be fired' (Hughes 1974: 127, 133).

This was because in the stress of battle, human factors always figure more greatly than technical ones; and not just through loading and firing too quickly. By way of example, a Black Watch officer named David Stewart of Garth sagely recounted how the Caribs of St Vincent had a great reputation as marksmen; and to test it one day he had a prisoner successfully shoot an orange off the top of a bottle at 200yd (Garth 1822: II.278). On being questioned as to why he had not shot with such deadly aim against the soldiers who captured him, the Carib dryly replied that oranges did not shoot back or run at him with bayonets! Thus the great Maréchal Saxe acidly commented that ‘Powder is not as terrible as it is believed. Few men in these affairs are killed from in front or while fighting. I have seen whole salvos fail to kill four men ...’ (Saxe 1944: 32–33).

Consequently, while troops are certainly known to have opened fire at ranges up to 300yd and occasionally at even longer distances, for all practical purposes the maximum *effective* range of the flintlock musket as demonstrated in those tests was at best only 100yd. Injunctions to wait until you could see the whites of your opponents’ eyes before shooting were therefore no mere hyperbole; and therein, it seemed, lay the problem. In very simple terms, from firing – in ideal conditions, as we have seen – the flintlock took between 20 and 30 seconds to reload properly, yet because the firefight was commonly conducted at such a short range, a resolute foe – whether he be a Highland clansman or a Prussian grenadier – might be able to close sufficiently to trigger the fight-or-flight reaction during that interval, especially if the defending unit was already displaying signs of nervousness, including firing too fast and too wildly. From the very beginning, therefore, tactical doctrines were variously framed either to ensure that response, or to prevent it.

TACTICAL DEVELOPMENT

Early doctrine

On 12 January 1746 Lieutenant-General Henry Hawley, the British Army’s commander-in-chief Scotland, issued a set of fighting instructions to his troops shortly before they marched against the Jacobite rebels, advising that:

They Commonly form their Front rank of what they call their best men, or True Highlanders, the number of which being allways but few, when they form in Battallions they commonly form four deep, & these Highlanders form the front of the four, the rest being lowlanders & arrant scum.

When these Battallions come within a large Musket, or three score [60] yards, this front rank gives their fire, & Immediately thro’ down their firelocks & Come down in a Cluster with their Swords & Targets ...



Even general officers could carry muskets if the situation demanded, as seen in this mezzotint by Richard Houston (1721–75) based on Charles Townshend’s famous watercolour sketch of Major-General James Wolfe at Quebec in 1759. Indeed, not only is the young general carrying a musket slung on his back; rather than the customary sword, he also carries a bayonet for his musket on a belt around his waist. Although Wolfe was given to calculated acts of bravado such as this, it was also perhaps a sensible precaution when carrying out a reconnaissance in the hostile Canadian wilderness. (Anne S.K. Brown Military Collection, Brown University Library)

The sure way to demolish them is at 3 deep to fire by ranks diagonally to the Centre where they come, the rear rank first, and even that rank not to fire till they are within 10 or 12 paces but If the fire is given at a distance you will probably be broke for you will never get time to load a second Cartridge ... (Quoted in Tomasson & Buist 1967: 105–06)

Although an encounter with wild Highland clansmen may be regarded as untypical of 18th-century warfare, both this particular situation, and the fighting instructions framed by Lieutenant-General Hawley to address it, do very effectively encapsulate some of the basic issues which shaped tactical thinking and doctrine throughout the service life of the flintlock musket.

In the first place, in order to control and concentrate the available firepower and to compensate for the acknowledged inaccuracy of the smooth-bore musket, individual firing was eschewed in favour of volley fire. That is, men were ordered to fire in unison – by volleys – in the expectation that although only some of their bullets might hit the target, sufficient casualties would be inflicted simultaneously to affect morale as well as have a physical effect on the enemy. Such a result was frequently referred to as ‘staggering’ the opposing unit, hopefully bringing it to a halt and even rendering it vulnerable to a counter-attack. The more men delivering that volley the greater (hopefully) the effect; on the other hand, it was also reckoned necessary to avoid being embarrassed by the possibility of facing an undaunted foe, with empty muskets. This could result in semi-farcical encounters such as the famous meeting between the British and French Guards at the battle of Fontenoy (11 May 1745), where each side rather hopefully invited the other to fire first!

The most obvious answer appeared to be to arrange the firing so that only a proportion of the shooters discharged their muskets at any one time. This might seem self-evident, but it introduced problems of its own. In order to accomplish it, those early drill books devised by Prince Johan of Nassau in the late 16th century for use with the slow-loading matchlock musket required deep but loose formations on a relatively broad frontage. Ordinarily, a body of musketeers would be drawn up in files or strings ten men deep, with sufficient distance – a pace or about 30in – between each file for a man to pass through. A process called ‘Firing by Extraduction’ then enabled the musketeers to fire by ranks. As soon as the men in the front rank had fired, they were required either to fall back between the files, or to break off and pass around the flanks, to the rear and there commence reloading. The second rank would then do likewise, and so on until the original front rank found itself once again in its proper place, reloaded and ready to go.

Supposedly, by this means a steady rolling fire could be maintained rank by rank for so long as the ammunition lasted, but it obviously had its limitations. As each rank retired, those behind were intended to step forward so that the unit as a whole maintained its position. In practice, there was an obvious tendency for the unit to gradually drift backwards as the retiring ranks naturally wanted to move back as far from the front as they could decently contrive, and the succeeding ranks did not always step forward as briskly as they ought. Advancing was also supposedly



possible in a variant styled ‘Firing by Introduction’, which reversed the process by leaving the front rank standing where it was to reload while successive ranks moved up past it, although in practice it was difficult to accomplish smoothly, and consequently little used.

Both processes no doubt looked splendid on a parade ground, but the constant interchange of the ranks was a sure-fire recipe for confusion and occasionally disaster, especially in the face of an aggressive foe. In the course of an attack on the fortress of Basing House during the English Civil War, the front rank of the Westminster Trained Band regiment duly fired a volley at the enemy, but before they could clear away they were themselves shot down by an all-too-hasty point-blank volley fired into their backs by their own second rank!

Such dramatic misadventures aside, there was little weight or impact to firing in this manner, since only 10 per cent of the regiment’s potential firepower was delivered with each volley. In the 1620s, Sweden’s King Gustavus Adolphus – profiting by the availability of lighter muskets and the abandonment of the staff or rest – improved this somewhat by reducing the number of ranks to six. Rather more boldly, he also introduced what was termed the ‘Swedish Salvee’. As usual, there were a number of minor variations of the technique, but in its simplest form the three rear ranks came up into the intervals between the three forward ranks. Those in the front rank would then kneel, while those in the centre stooped and the rear rank aimed over both; the whole lot would then fire together. It is important to note, however, that no attempt was then made to reload; instead, this technique was employed immediately to precede or receive a charge. As we shall see in due course, dramatic as it was, this technique was not without its disadvantages, and for the ordinary business of infantry fighting the Swedish monarch instead preferred a variation of the Dutch ‘Extraduction’ in which pairs of ranks fired together rather than singly; but it was still a relatively slow business and far from satisfactory.

Dating from the 1870s, this splendid work by Henri Philippoteaux (1815–84) shows the opposing British and French battle lines at the battle of Fontenoy as the officers of the Gardes Françaises and Coldstream Guards exchange gentlemanly compliments and, perhaps apocryphally in the case of Lord Charles Hay, raise a glass of wine to toast their encounter. This was no empty courtesy taking aristocratic manners to an absurd length, but was a calculated exchange carried out in the confident expectation that while the side which chose to fire first might expect to inflict heavy casualties, especially at such a short distance, if their opponents held firm then they would then be able to march much closer and so inflict even heavier casualties at point-blank range. This did not always work. Sometimes that initial volley might be devastating enough, but at Fontenoy the French Guards fired first and then were broken by the British return fire. (© V&A Images / Alamy)



ABOVE AND OPPOSITE

The term Charleville was popularly but not entirely accurately applied to a particularly long-lived and extremely influential family of flintlock muskets. In 1717 the French Army adopted a standard pattern of musket based on a pattern then produced at the Charleville factory and this evolved throughout the 18th century. Illustrated here is the sturdy *Modèle 1763* which was sent across the Atlantic to help arm the American rebels and was subsequently copied at the Springfield Arsenal as the US 1795 Pattern. The subsequent *Modèle 1777* saw even wider use throughout Europe and beyond until the adoption of the percussion system. The version shown here is the standard infantry model, but other weapons for cavalymen and artillerymen followed the same pattern, varying only in the barrel length and some of the fittings. (NRA Museums, NRAMuseums.com)

Rank upon rank: the French experience

Although the process of abandoning the pike began at a time when most musketeers were still armed with matchlock muskets, it was very much hastened by the increasing availability of the flintlock musket or fusil, especially once the introduction of the bayonet finally rendered the pike superfluous. Quite apart from being lighter and considerably handier, the flintlock offered solutions for many of the matchlock's operating deficiencies. Not the least of them was that because the flintlock could be loaded more easily and more quickly – and more safely – than a matchlock, it meant that there was no need to cycle the ranks in order to accommodate the loading sequence, and therefore no need for the wasteful five- or six-deep formation or the broad intervals between the files.

Paradoxically, however, despite the eagerness with which ordinary French soldiers had embraced the flintlock itself, there was no corresponding effort on the part of their commanders to develop appropriate new tactical doctrines to optimize its performance. In part this was due to King Louis XIV's obstinate insistence on retaining the matchlock, in spite of what his soldiers were actually doing. Consequently, as late as the *Ordonnance* of 1703, this meant a five-deep formation was still being officially prescribed to accommodate the matchlock, with four paces between each rank and a pace between each file. Notwithstanding, with most soldiers already carrying flintlocks a much simpler alternative – described in 1683 by an officer named François Demorinet in his privately published *Le Major Parfait* – appears to have been what was normally practised:

The best way of firing is by ranks when it is desired to fire in line, parallel to the foe. To do this, and to fire without embarrassment, it is best to fire at the halt without making any move except that needed to make the first five ranks kneel on the ground; and the sixth is that which makes first its fire, the fifth then doing the same and the rest consecutively. (Quoted in Chandler 1976: 116)

While it was a considerable improvement, there were still a number of drawbacks to this practice, the most obvious being the inability to correct the near-universal tendency for musket-armed soldiers to fire high. The customary injunctions to soldiers to aim low were not likely to be heeded when their comrades' heads were immediately in front of them. It may be significant in this regard that when Saxe commented on the inadequacies of the musket, he morbidly noted how few were killed 'from in front'.

This particular problem would be alleviated by the practice known as 'locking up'; that is, immediately before firing, the ranks not only closed up to the front, but the men physically interlocked in such a way that the muzzles of the rear-rank muskets cleared the heads of the men kneeling in the front rank. This was still not the complete answer, for although it was theoretically possible for well-trained troops to close up sufficiently for four ranks to fire together, with two kneeling and two standing, in practical terms three ranks was about the limit, although this was not officially sanctioned until an *Instruction* of 14 May 1754.

In effect this practice of locking, coupled with the continued reliance on firing by ranks, was no more than a variant of the 'Swedish Salvee' of a century earlier. While at first sight it is easy to criticize this apparent conservatism on the part of French officers, it was in very large part a reflection of the very shallow zone of fire. In order for musketry to be effective, infantrymen needed to move into very close proximity indeed to their opponents. Yet, as soon as they halted to fire, that very proximity notoriously discouraged them from resuming the advance. Thus, in 1691 King Louis XIV went so far as to order his field commander, Maréchal Luxembourg, to avoid an infantry battle since such an engagement 'involves heavy losses and is never decisive' (quoted in Chandler 1976: 113). Avoiding an infantry battle was never a realistic option, but there was no denying that in this case he had a point, for halting to engage in a close-range firefight was usually a protracted and sometimes costly affair to no good result. What was more, standing fast could be highly dangerous if the opposing side *was* prepared to close that short but critical distance and so trigger the fight-or-flight response.

By way of illustration, Maréchal Saxe's experience at the battle of Belgrade in 1717 curiously echoes Lieutenant-General Hawley's instructions quoted earlier. While the latter recommended waiting until the Highland clansmen were only 10 or 12 paces distant before firing by ranks, Saxe described how two Austrian battalions fired into the charging Turks at 30 paces:

The fire and the *mêlée* were simultaneous and the two battalions did not have time to flee for every man was cut to pieces on the spot. The only persons who escaped were M. de Neuperg, who, fortunately for him was on a horse, and an ensign with his colour, who clung to my





This is a front-rank fusilier at 'Appretez vos armes' ('Cock your arms') according to the French *Ordonnance du Roy* of 6 May 1755, as drawn and engraved by Colonel Baudoin and copied into Diderot's *Encyclopédie*.

horse's mane and bothered me not a little, and two or three soldiers ... [afterwards] I had curiosity enough to count the dead: I found only 32 Turks killed by the general discharge of the two battalions – which has not increased my regard for infantry fire. (Saxe 1944: 32–34)

Nevertheless, it seems to have been generally agreed by most commentators that the initial volley or series of volleys delivered by French troops was heavy and frequently effective. The problem, however, lay in sustaining it. More often than not, if the initial volleys were not immediately followed up by a bayonet charge, any meaningful form of fire control was cast to the winds as the troops engaged in what was termed a *feu de billebaude* – a rapid but disorderly fire, delivered by every man armed with a musket.

Therefore, if the apparent lack of interest displayed by French officers towards the study and development of fire control and tactics was in contrast to the near-obsession with the subject displayed by some of their contemporaries in other armies, there was in fact good reason for the French stance. It was not the consequence of indifferent conservatism, but by and large because French officers looked not to the musket itself but to the bayonet fixed on the end of it. Instead of focusing on winning the firefight, they preached instead the twin virtues of mobility and decisive shock, delivered by columns charging with the bayonet.

Saxe was not alone in his lack of confidence as to the effectiveness of the flintlock musket as a missile weapon, and most other French theorists of the day – in particular the influential Chevalier de Folard – also found a receptive audience when promoting what would eventually become the cult of the bayonet. In contrast to defeats such as Malplaquet, where the French infantry had essentially stood on the defensive and unsuccessfully attempted to shoot it out with the Allied forces, Folard instead pointed to actions like Denain (24 July 1712), where heavy columns of French infantry had charged with the bayonet to pierce the opposing battle line. The French character, he reckoned, 'is infinitely better suited for shock and for coups de main than for standing still and firing' (quoted in Chandler 1976: 131). Although criticizing some of Folard's proposals as ill-defined and impractical, Saxe agreed with him in principle, telling Frederick the Great in 1746 that 'The French are what they were in Caesar's time, and as he has described them, brave to excess but unstable ... As it is impossible for me to make them what they ought to be, I get what I can out of them and try to leave nothing of importance to chance' (quoted in Chandler 1976: 126).

The upshot was that while the popular stereotype of thin battle lines of British redcoats being attacked by French columns is something normally associated with the Napoleonic Wars, manoeuvring and rapidly attacking in column was in fact at the centre of French infantry tactics throughout the 18th century. Indeed, it was often quite literally so, since there was a decided preference for reproducing the old formations of Prince Johan of Nassau on a larger scale. This was seen on battlefields as far apart as the Plains of Abraham outside Quebec in Canada on 13 September 1759 and Wandiwash in India on 22 January 1760, with those battalions posted in the centre being formed in assault columns with fixed bayonets, while those on either flank were deployed in line to provide fire support – just as musketeers had once done for the pikemen.

Platooning: the British experience

Naturally enough the British Army, like the French, had started off firing by ranks, and it is for once possible to determine with a fair degree of accuracy when a switch was made from the old fighting methods of the days of the matchlock and pike to a modern system based around the flintlock and which, with successive refinements, would carry the British through the next century and beyond.

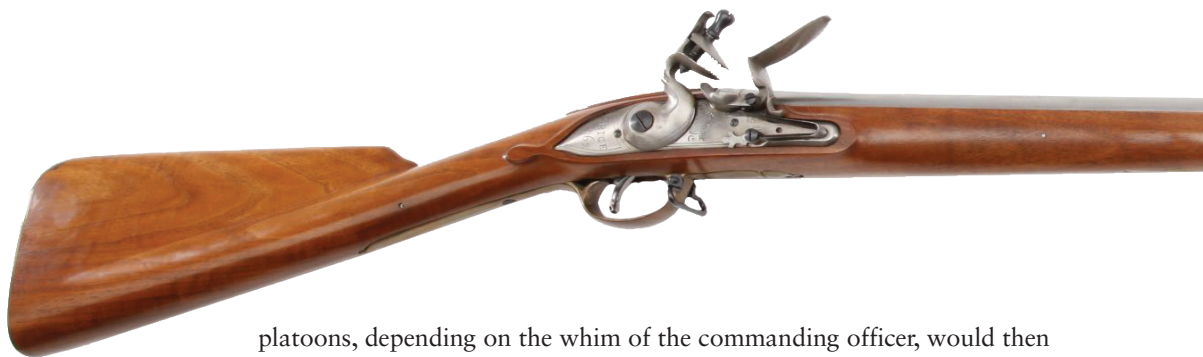
A copy of Demorinet's *Le Major Parfait* advocating firing by ranks was marked up as belonging to King James II in 1686. Two years later, however, James was overthrown by his Protestant son-in-law, Prince William of Orange, and in 1689 the then Earl of Marlborough sought clarification as to whether his new King 'will have the Regiments of Foot to learn the Dutch exercise, or else to continue the English, for if he will I must have it translated into English' (quoted in Chandler 1976: 116). Not unnaturally, William wanted his new British troops trained in the same manner as his Dutch ones, and so just as soon as the drill book could be translated, the redcoats adopted a Dutch procedure known as platoon firing, or platooning.

At this point it is worth emphasizing that in most European armies of the time, the day-to-day organization and the tactical deployment of an infantry unit were two quite separate issues. In administrative terms, the regiment or battalion was made up of a number of companies, each commanded by a captain and two or three junior officers. At the outset of the period under discussion, when infantry units comprised both musketeers and pikemen, deploying into a battle line required the two to go their quite separate ways. While the pikemen of each company were consolidated into a single body or 'stand' forming the centre of the battalion formation, the musketeers went into the wings of shot flanking either side of the pikes. The officers, meanwhile, instead of leading their own men, were distributed as required around the battalion. Similarly, platooning at first took no account of the ordinary company structure, but instead saw the whole battle line arbitrarily divided up into tactical sub-units called platoons.

Ironically, the term was originally derived from the French word *peleton*, which became the Dutch *platoon*, and from whence it migrated to their British allies. In the French service it was applied to the brigading-together of two companies, but it had a quite different meaning in the Dutch and British services. With the exception of the grenadiers – who were themselves divided into two separate platoons and posted to anchor either flank of the battle line – the individual companies first drew up side by side in just three ranks according to a predetermined order of precedence based on seniority. Then the regimental major, or his faithful assistant the adjutant, would ride along the battle line telling off the men into four equally sized divisions (corresponding to French *peletons*) for manoeuvring purposes without any regard as to which company they actually belonged. At the same time, within each division the men would be told off into platoons for fire-control purposes. At first, it was considered that ideally there ought to be four platoons within each grand division, but experience soon taught that the optimal size of a platoon was between 30 and 50 men, and so depending on the number of men actually present and fit for duty, it was more common to find only three platoons in each division. These



This British infantryman is cocking his musket while kneeling in the front rank, in a virtually identical manner, but illustrated in Windham's *A Plan of Discipline, Composed for the Use of the Militia of the County of Norfolk*, usefully demonstrating the degree of cross-fertilization in tactical doctrine in the middle part of the 18th century.



ABOVE AND BELOW

The Short Land Pattern musket illustrated here was the direct equivalent of the French *Modèle 1764*. Officially it was introduced in 1768 as the British Army's standard infantry weapon but had in fact been carried by dragoons since the 1720s. Although effectively superseded by the simpler India Pattern in the late 1790s it continued in use throughout the Napoleonic Wars. The immediate points of identification from the older version are the iron ramrod and long 'trumpet'-shaped pipe to accommodate it. Another identifier is the lack of a date on the lock. The practice of dating locks was abandoned after 1768 as too many officers refused to accept 'old' weapons irrespective of whether they had actually been used. (NRA Museums, NRAmuseums.com)

platoons, depending on the whim of the commanding officer, would then in turn be allocated to one of three or occasionally four 'Firings' – with the exception of the grenadiers, who fired as they saw fit.

There were a number of different combinations in which volleys could actually be delivered, but by way of illustration, if we suppose there to be three platoons in each grand division, each of them would fire in sequence. On the word of command all four platoons of the 'First Firing' (i.e. one platoon in each division) would discharge their muskets in the general direction of the enemy, followed in due course by the four platoons of the Second Firing and then those of the Third, by which time it was expected that the platoons of the First would have reloaded. There were numerous variations on this, and rather than simply firing sequentially from right to left, the commonest method was to mirror the numbering of the firings, so that the sequence of volleys ran outwards from the centre to the flanks, or occasionally vice versa.

Captain Richard Parker of the 18th Royal Irish Regiment provided a splendid illustration of platoon firing in action in his account of the battle of Malplaquet in 1709:

We continued marching slowly on, till we came to an opening in the wood. It was a small plain, on the opposite side of which we perceived a battalion of the enemy drawn up, a skirt of the wood being in the rear of them. Upon this Colonel Kane, who was then at the head of the Regiment, having drawn us up, and formed our platoons, advanced gently toward them, with the six platoons of our first fire made ready. When we had advanced within a hundred paces of them, they gave us a fire of one of their ranks: whereupon we halted, and returned the fire of our six platoons at once; and immediately made ready the six platoons of our second fire, and advanced upon them again. They then gave us the fire of a second rank, and we returned them a second fire, which made them shrink; however they gave us the fire of a third rank after a scattering





manner, and then retired into the wood in great disorder: on which we sent our third fire after them, and saw them no more. We advanced cautiously up to the ground which they had quitted, and found several of them killed and wounded ... we had but four men killed, and six wounded: and found near forty of them on the spot killed and wounded.

As Parker smugly continued: 'Again the manner of our firing was different from theirs; the *French* at that time fired all by Ranks, which can never do equal execution with our Platoon-firing, especially when six Platoons are fired together. This is undoubtedly the best method that has yet been discovered for fighting a Battalion; especially when two Battalions only engage each other' (Parker 1968: 88–89).

In terms of arithmetic, if we suppose both battalions to be of equal strength, as much as one-third of the British muskets were being fired in each volley, as against a quarter of the French ones, even assuming the latter to be drawn up in four ranks rather than the officially prescribed five. Moreover, on the French side the musket's normal tendency to shoot high was also exacerbated by the practice described by Demorinet of commencing firing with the rear rank, who were naturally concerned to avoid blowing the heads off their comrades kneeling in front of them. That particular advantage was of course a theoretical one, and disappeared once the French reduced formation depth from four ranks to three.

Nevertheless, having hit upon what *appeared* to be a highly effective method of fire control, the British Army adhered to it obsessively for the next 50 years. Indeed, it did so to the point where the terms 'volley' and 'platoon' were used interchangeably and officers of quite small detachments could speak of 'firing a platoon' or say that 'we gave them a platoon', rather than a volley. However, successful as platoon firing had been at Malplaquet and other battles in the Duke of Marlborough's day, much of this peacetime obsession actually stemmed from a lack of opportunity for broader training. There were few barracks, and so most British regiments were widely dispersed in billets or on detached duties, or even spending a surprising amount of time simply marching from place







Platoon firing (previous pages)

This plate provides a demonstration of the platoon- or alternate-firing system in its classic form, performed in accordance with David Dundas' *Rules and Regulations* of 1792. Two companies of the 2/1st (Royal) Regiment, which fought against the Republican French at the siege of Toulon in September–December 1793, have been linked together as a division; for fire-control purposes each company is reckoned as a platoon or sub-division, and the two are firing alternately. The platoon standing on the left has just fired a volley and the men are now reloading at their best speed. The other platoon in the division is already loaded and has not only locked its ranks forward, but has recovered its muskets in the 'make ready' position and ideally will wait until its sister platoon has finished reloading before delivering its own volley. Beyond its flank the right-hand platoon of the neighbouring division is actually delivering its fire, but timed slightly behind, as part of a ripple running from the flank of the battalion into the centre. The other two divisions will mirror this ripple by firing in towards the centre from the left flank. The remaining two companies of the regiment, the grenadiers and the light infantry, if not physically detached normally took post behind the flanks as a reserve.

to place. Consequently, they were only brought together to train as a complete battalion for a relatively brief period each year, and in the meantime had little opportunity to practise much more than their basic foot drill and the 'manual exercise', as weapon-handling was termed. This in turn meant that little thought was given to refining the platoon firing system, much less replacing it with something better.

This was unfortunate, because although supposedly an effective means of conducting a static firefight, platoon fire was ill-adapted to stopping a determined assault by men relying instead on their bayonets, or Highland broadswords. To put it simply; a spluttering platoon fire could not kill enough of the attackers fast enough to stop them before they closed those last few critical yards to trigger the fight-or-flight response. Consequently, as early as 1746 we find Lieutenant-General Hawley instructing his troops not to engage in platooning, but to fire by ranks when engaging columns of Highlanders. What was more, notwithstanding his professed disdain for Hawley, James Wolfe advocated much the same thing in the mid-1750s when training his men to counter French column attacks – something which he put to use with devastating effect against the regiments of Béarn and Guyenne on the Plains of Abraham.

The inevitable result of this peacetime obsession with platooning was a dangerous degree of complacency which was badly upset in the 1740s; not just by those fast-moving Jacobite Highlanders, but also by the salutary shock of the battle of Dettingen on 27 June 1743, the first major battle against the French since Malplaquet. There, despite all those years of practice, officers such as the young James Wolfe found to their horror that their supposed ability to control the fire of their men over a sustained period, whether by platooning or by any other means, simply evaporated. Although the British Army again emerged victorious from both experiences, it led Wolfe to introduce Frederick the Great's 'Alternate Firing' while serving as the lieutenant colonel of the 20th Regiment of Foot in 1755:

As the alternate fire by platoons or divisions, or by companies, is the most simple, plain and easy, and used by the best disciplined troops in Europe [i.e. the Prussians], we are at all times to imitate them in that respect, making every platoon receive the word of command, and to make ready and fire from the officer who commands it; because in battle the fire of our artillery and infantry may render it difficult to use any general signals by beat of drum. (Wolfe 1780: 35)

Rather than dividing the battalion into ad hoc divisions and platoons without regard to the existing company organization, the Alternate Firing system was indeed simple and effective. At the time a British infantry battalion comprised just nine companies on the peacetime establishment, one of them being the grenadiers. Before embarking on field exercises or active service, the eight centre or battalion companies were 'levelled'; that is, men were temporarily cross-posted to ensure that each company was approximately the same size. Then, the companies were paired to form the grand divisions in the French manner, as Wolfe went on to explain:

Every grand division consisting of two companies as they now are, is to be told off into three platoons, to be commanded by a captain, a lieutenant, and an ensign, with a serjeant to each [division]; the rest of the officers and non-commissioned officers are to be distributed in the rear to keep compleat the files, to keep the men in their duty, and to supply the places of the officers or serjeants that may be killed or dangerously wounded. (Wolfe 1780: 47)

Notwithstanding official disapproval by the Duke of Cumberland, who was at the time more concerned with enforcing a common system and practice

British grenadiers are shown in action during the siege of Louisbourg in June–July 1758 in this watercolour by Richard Simkin (1850–1926). Note how both the sergeant, identified by his red-white-red waist sash, and the officer on the right, identified by a crimson silk net sash and lack of heavy armour, are both primarily armed with flintlock muskets and bayonets rather than the archaic halberds and espontoons still being carried by their respective counterparts in the line. Note also that the primary ammunition supply carried in the grenadiers' large cartridge box behind the right hip is supplemented by a smaller belly box containing up to 12 rounds of ready-use ammunition. (Anne S.K. Brown Military Collection, Brown University Library)



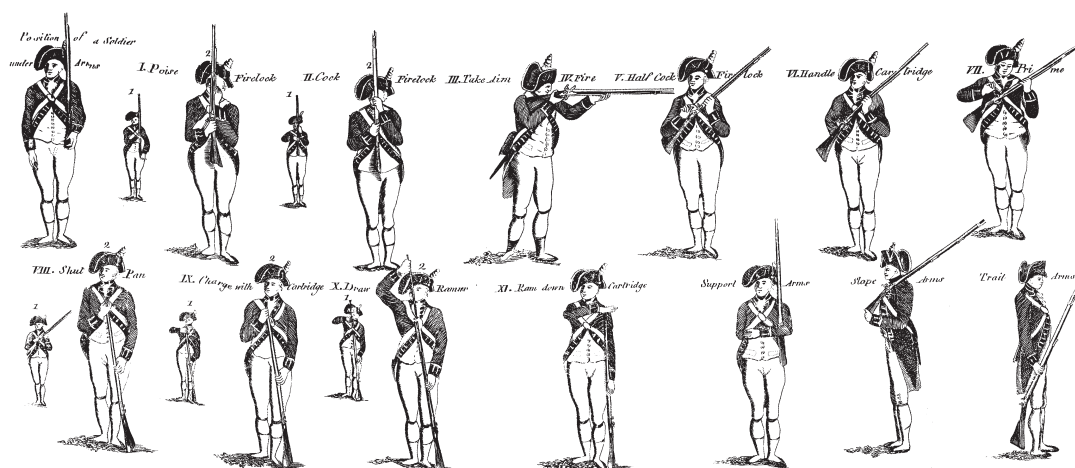
throughout the army than with sanctioning deviations from it devised by 'some fertile genius', this modified form of platoon-firing very quickly took hold and officially, if not always in practice, remained the cornerstone of British infantry tactics throughout the life of the flintlock. However, Wolfe also introduced a further refinement. Instead of dividing each two companies into three platoons, his warning orders for the unsuccessful attack on the French lines at Montmorency (31 July 1759) required that the regiments should embark, land and fight *by companies* under their own officers, which as Captain John Knox of the 43rd Regiment of Foot noted, 'afforded the highest satisfaction to the soldiers' (Knox 1914: I.451). No doubt it did; but, more importantly, once the shooting started it was also much easier for the officers to control the fire of their own men.

This new arrangement was then confirmed in the 1764 *Regulations*, when for firing purposes companies were designated as sub-divisions. Although the choice was left to the discretion of the commanding officer as he adjudged the circumstances, volleys were increasingly delivered not by small sub-units, but by divisions, wings or whole battalions.

Loose Files and American Scramble

In any case, the pernicious legacy of firing by sub-units inherited from the old matchlock was soon entirely turned on its head, and again it was in North America, just a few years later during the American Revolutionary War. That conflict was made possible in the first place by the very existence of the flintlock musket, for it was a self-contained weapon system found in many colonial homes, either for militia service or for hunting, or for both. It was accordingly relatively easy to assemble the insurgent forces at the outset, not always at a minute's notice to be sure, but at least with a certain degree of confidence that those willing to take up arms actually possessed those arms in the first place. What the American militias did lack, obviously, was any meaningful training and discipline. This placed them at a considerable disadvantage in the open field, since they could neither manoeuvre effectively nor display the fortitude and tenacity required to conduct a short-range firefight. Instead, in the early days they took to evening the odds by establishing themselves in defensive positions and firing from behind cover. In time the Patriot soldiers of what became designated the Continental Line evolved into very competent regular soldiers, but before that the British Army had itself evolved a new and highly effective tactical doctrine combining both flintlock musket and bayonet.

Even at the best of times a static firefight, as King Louis XIV had declared so long ago, 'involves heavy losses and is never decisive'; and so too, as the dreadful casualties at the battle of Bunker Hill (17 July 1775) demonstrated, did the slow cadenced pace considered essential to preserve the required perfect alignment of the advancing battle line. It did not take long for the British to realize that the most effective way to engage American troops, whether entrenched or out in the open, was to rush them and try to trigger the fight-or-flight reaction. If musketry was required, they might fire by ranks or even by complete battalions, and rapidly follow it up with a bayonet charge. This was delivered not in



column, in the French manner, but in the traditional line formation. In order to accomplish this, it was necessary to relax parade-ground discipline and instead not only adopt a two-deep formation, but tolerate what General William Harcourt would later refer to as ‘loose files and American scramble’.

Notwithstanding Major-General David Dundas’ attempts to reintroduce the rigidity of ‘Prussian’ drill and tactics in the early 1790s, the American experience won out and throughout the Napoleonic Wars British practice (as distinct from theory) eschewed platooning or anything resembling it in favour of firing by battalion, or occasionally (according to local circumstances) by wing or by division. Otherwise, practical experience – both in Europe and outside it – only served to confirm the French experience that engaging in a close-range firefight might be all very well when standing on the defensive, but it was likely to stall any attempt to advance, often with fatal consequences. As Lieutenant Andrew Leith Hay, a British staff officer, complained after Wellington’s victory at the battle of Salamanca on 22 July 1812:

The 6th [Division] suffered very much from having been halted when advanced about half way – which is a system that never will answer, the only way is to get at them with the Bayonet, that they [the French] can never stand, but as to firing that they will do as long as you like, and fire much better than we do. (Quoted in Muir 2001: 109)

Rank and file

There was thus, by the beginning of the 19th century, a pronounced but little-remarked convergence in British and French tactical thinking on the use of the flintlock musket, and so too in the manner of conducting a firefight once the advance had stalled. As noted earlier, after firing an initial series of volleys by ranks, French units generally commenced an irregular *feu de ballebaude*, in which each man loaded and fired in his own time. This was at first contrasted unfavourably with the fire of British units, who were

The *American Manual Exercise*, very largely based on the familiar British *Regulations* of 1764, as taught to the Continental Army by ‘Baron’ von Steuben.





File firing (previous pages)

During and after the Napoleonic Wars, file firing appears to have been the method of choice for conducting a sustained firefight, and it survived until the American Civil War in the 1860s, as shown here by the 19th Tennessee Infantry at Shiloh in April 1862. Essentially, as the term implies, each file – one man standing in the front rank and his bringer up behind – would quickly aim and fire in their own time, to be immediately followed in turn by the next file and so on until stopped. The advantage of this system was that it was possible to maintain control over the firing simply by checking a single file, thus interrupting the ripple rather than by frantically shouting and bawling at a whole company. While in theory a file firing could run from one flank of a regiment to the other, it was normally delivered within each individual company in order to help maintain that control.

of course supposedly using platooning, at Dettingen in 1743. After that battle, the defeated French commander, Maréchal de Noailles, reported:

I would never have believed, Sire, what I saw yesterday ... Their infantry drew up in close order and stood like a wall of bronze, from which there issued so quick and well sustained a fire that the oldest officers confessed that they had never seen anything like it, incomparably superior to ours. (Quoted in Houlding 1988: 21)

Yet while there was no denying the result, on the other side British eyewitnesses were more than a little uneasy at how their success had been accomplished, for as one account declared: ‘They were under no command by way of Hyde Park firing, but the whole three ranks made a running fire of their own accord, and at the same time with great judgement and skill stooping all as low as they could, making almost every ball take place’ (quoted in Chandler 1976: 127). Others said much the same, including James Wolfe, who bitterly complained how ‘The Major and I (for we had neither Colonel nor Lieutenant Colonel), before they came near, were employed in begging and ordering the men not to fire at too great a distance, but to keep it till the enemy should come near us; but to little purpose. The whole fired when they thought they could reach them, which had like to have ruined us.’ However, having fulminated at this complete lack of discipline so much at odds with the popular conception of 18th-century soldiering, Wolfe was grudgingly forced to admit, ‘We did very great execution with it’ (Willson 1909: 36–38).

The fact of the matter was that the British, too, were engaging the French in a *feu de billebaude*, and the superiority of their musketry on this occasion lay not in the vaunted system of platoon firing, but simply in their being better practised in the manual exercise. Wolfe’s response, as we have seen, was to devise a better mousetrap – first in the form of the Alternate Firing, and then in the recasting of companies as platoons. Yet although it no doubt looked very impressive on the parade ground, it was soon largely superseded by the practice of firing volleys by battalions. That was all very well if the volleys were immediately followed up by an advance with bayonets, but if they were not, it was then too late to revert to platooning, and once again a *feu de billebaude* followed.

While perfectly understandable in the circumstances, this irregular firing not unnaturally demanded some means of control. Maréchal Saxe, for his part, despairing of both platooning and firing by ranks, advocated a reversion to a mid-17th-century practice known as file firing:

I should designate an officer or non-commissioned officer to every two files. He should advance the leader of the first a pace forward and show him where he is to direct his fire, allowing him to fire at will; that is when he has found a target.

The soldier behind him will then pass his gun forward and the others in the same manner. The file leader will thus execute four shots in succession. It would be unusual if the second or third shot does not reach its mark. The commanding officer is close by him, watches his aim, directs him where to fire, and exhorts him not to hurry ...

This file having fired, the officer withdraws it and advances the second which performs in the same fashion. Then he returns the first which has had ample time to load. This can be repeated for several hours.

This fire is the most deadly of all, and I do not think any other can resist it. It would silence that by platoons or ranks, and even if they were all Caesars I would defy them to hold for quarter of an hour. (Saxe 1944: 103)

The battle of Shiloh (6–7 April 1862), as shown in this work by Alfred Edward Mathews (1831–74), had the dubious distinction of probably being the last in which significant numbers of the combatants (in this case belonging to the Confederate Army) were armed with flintlock muskets. While there is no doubting the superiority of the newer percussion muskets and rifle-muskets, the very close ranges at which most of the fighting took place in the woods and clearings at Shiloh meant that the difference in performance was not perhaps as marked as it might have been on a more open field. A great many other engagements during the American Civil War were fought at ranges well within the smooth-bored flintlock's envelope of effectiveness. (Anne S.K. Brown Military Collection, Brown University Library)



Not for the first time Saxe was being too clever by half, and a firing method devised for long-range shooting in the days of matchlock muskets with rests was ill-adapted to the frantic pace of a close-range firefight with flintlocks. Instead, the reduction in the number of ranks to three – and latterly, in the British and American services, to two – facilitated a slightly different form of file firing which can best be likened to a ‘Mexican wave’.

By way of celebrating victory or any other notable event, armies were already accustomed to saluting with a *feu de joie*, or fire of joy. Commencing with the right-hand file of the right-hand battalion in the front line, each file would fire in turn, one after the other; and very impressive it looked too, especially when followed up by the singing of a solemn *Te Deum*. However, it also had a practical application, and in a firefight, instead of rippling the firing clear across the front of the battle line from right to left, it was generally fired by companies. This was succinctly described by David Dundas, the celebrated author of the *Principles of Military Movements*, which went on to become the basis of the official 1792 *Rules and Regulations for the Formations, Field Exercise and Movements of His Majesty’s Forces*: ‘In firing companies by *Files* each company fires independent. When the right file presents, the next makes ready, and so on. After the first fire, each man as he loads comes to a recover, [holds his musket vertically at the ready] and the file again fires without waiting for any order; the rear rank men are to have their eyes on their front rank men, and be guided by, and present with, them’ (Dundas 1792: 329). He was not, however, in favour of the practice and rather predictably warned that: ‘As long as the fire by battalion, half battalion, or companies, can be kept up regular, it is highly advantageous and can be at any time stopped; but, should file-firing be allowed, and once begun, unless troops are exceedingly cool and well disciplined, it will be difficult to make it finish, and to make them advance in order’ (Dundas 1792: 426).

Notwithstanding Dundas’ disapproval, wartime experience saw file firing become firmly established as the method of choice for a sustained firefight, and it was still widely practised as late as the 1860s, most notably during the Crimean War and American Civil War. Despite Dundas’ reservations, the fact of the matter was that file firing was the most practical means ever devised of conducting a *sustained* firefight with flintlock (and percussion) single-shot muskets. Platooning not only required an impractical amount of training at battalion level, but was unsustainable because it required a degree of careful control simply not possible amid the din and awful confusion of battle. File firing, on the other hand, saw control of the firefight devolved to those best placed to exercise it – the individual company officers. That being said, as Dundas grumbled, such delegation not only passed control of the firefight out of the hands of brigade and battalion commanders, but once again made it extremely difficult to preserve the momentum of an attack, hence the preference at a higher level for firing an initial volley by battalion followed up immediately by an advance with fixed bayonets.

A la baionnette!

One of the ironies of infantry combat during this period was the near-universal assertion by officers on all sides that the bayonet was not only more important than the flintlock musket to which it was fixed, but that it was the weapon best suited to their own national character – and sometimes uniquely so! It would be more accurate to say that fixing a bayonet on to the end of a flintlock musket turned an essentially defensive weapon into an offensive one. Resolute men armed with matchlocks could effectively defend themselves against an enemy by closing their ranks tightly and turning up the butt ends of their muskets.

Attacking was a different matter. In terms of the initial assault, it was often straightforward enough. The musketeers would fire a massed salvo and wildly charge forward, as the English Royalist infantry did to some effect at the Battle of Naseby on 14 June 1645: 'The Foot on either side hardly saw each other until they were within Carabine Shot, and so made only one Volley; ours falling in with Sword and butt end of the Musquet did notable execution so much as I saw their Colours fall and their Foot in great disorder' (Walker, 1705: 130). Unfortunately, in achieving this dramatic success the Cavaliers had themselves dissolved into a disorderly mob with unloaded muskets, and quickly succumbed to the disciplined musketry of the enemy second line. It was a similar story elsewhere – in Scotland, for example, where the volley and headlong rush was a favoured tactic of Highland troops, and rendered the attackers equally vulnerable to a disciplined counter-attack.

The bayonet changed matters by offering infantrymen a means of launching an equally intimidating assault, while at the same time maintaining their formation and unit integrity. It is something of a cliché to say that the bayonet turned each musketeer into his own pikeman. Nevertheless, it was quite literally true. Until artillery

'Charge Your Bayonet Breast High' as depicted in Major George Grant's *New Highland Military Discipline*. The origin of this technique in 17th-century pike-handling drill is obvious.



and rapid musketry made a sad havoc of them, well-disciplined bodies of pikemen were assault troops *par excellence*. Once provided with bayonets, musketeers were able to emulate pikemen by advancing steadily and in good order rather than running wildly at their opponents.

Naturally enough, therefore, in doing so they at first simply adapted existing techniques to handle and fight with their bayoneted flintlock muskets exactly as if they were pikes. In the first instance, in the British service this meant closing up their order and marching with their muskets held vertically rather than sloped on their shoulders. Once ready to attack – or to receive an attack – the soldier made a half-turn to his right, thus presenting his left side towards the enemy, just as if he were about to fire. (Indeed, if he had not already done so this was often accounted an appropriate time to fire a last volley.) At the same time and as part of that movement the musket was brought down into a horizontal position, breast or shoulder high. The forend was held in the left hand under the chin, with the butt still clasped in the right hand almost an arm's length behind. For all practical purposes, bayonets could be presented in this way only by the front rank or at best by the first two ranks, while those behind continued to hold their muskets vertically or at the high port unless required to step forward. Thus formed, it was possible to advance slowly and steadily, in a suitably menacing fashion, while retaining the all-important unit integrity. If, in the face of this advance, the enemy did not take the hint and run away, the final command as in the days of the pike was to 'Push!', at which point the soldier would thrust his bayonet, still held in the left hand but vigorously propelled forward by the right hand pushing the butt. It was, for those facing it, extremely intimidating. (The author vividly recalls how, during a documentary filming session, some hitherto very confident re-enactors representing Highland clansmen visibly blanched when he had this particular technique demonstrated to them by other re-enactors representing British soldiers.)

It could be an equally effective technique when used defensively. At Culloden Moor in 1746, faced by a Highland charge, the British infantry employed an imaginative but quite devastating variation. A few months earlier, Lieutenant-General Hawley had enjoined his troops to hold their

Scaling the breach (opposite)

This plate, depicting King Louis XIV's *Gardes Françaises* assaulting the breach of a fortress somewhere in Flanders in the early 1700s, illustrates the astonishing versatility of the flintlock musket in comparison with older weapons. One of the guardsmen, his long-branched bayonet fixed, gallantly scrambles up the rubble in what was once the pikeman's role, while a comrade provides covering fire with his musket. Beside them a grenadier makes use of his musket's sling to carry it on his back, leaving both hands free to light and toss his hand grenades and, if necessary, scramble over what remains of the parapet at the top. Note how the musket is slung butt up and muzzle down, with one sling-swivel behind the trigger-guard and another near the muzzle. This was to be the standard way of carrying the musket by its sling, whether on the back or on one shoulder, throughout the life of the weapon.



fire until the enemy was within 10 or 12 paces, for if they fired earlier they would never get a chance to load another round. Saxe, on the other hand, and probably quite rightly, considered on the basis of his own experience at Belgrade in 1717 that waiting so long was too risky. At Culloden the regimental officers took a chance and did indeed manage to fire two volleys into the approaching clansmen. The second volley was fired at extremely close range and, like the Austrians at Belgrade, Barrell's 4th Regiment of Foot found the volley and mêlée to be simultaneous and were overrun, with heavy losses. Monro's Regiment, standing next to them, were luckier – literally by a matter of seconds – for immediately on firing that second volley, the front rank made no attempt to reload, but charged their bayonets as described. The second and third ranks, however, protected by the bayonets of the first rank, did continue loading and firing to devastating effect, as related by an unknown corporal in the *Newcastle Courant* in May 1746:

When we saw them coming towards us in great Haste and Fury, we fired at about 50 Yards Distance, which made hundreds Fall; notwithstanding which, they were so numerous, that they still advanced, and were almost upon us before we had loaden again. We immediately gave them another full fire, the Front Rank charged their Bayonets breast high, and the Center and Rear ranks kept a continual Firing, which in half an Hour's Time, routed their whole Army. Only Barrel's Regiment and ours was engaged, the Rebels designing to break us or flank us; but our fire was so hot, most of us having discharged nine Shot each, that they were disappointed.

As effective as the bayonet thrust was when used defensively, it did not take long to realize that a technique once devised for use with a pike sometimes 16ft long or more was in need of some refinement for a weapon less than 6ft long. Levelling the pike at breast height had been necessary in the first place to balance and control it properly when holding it horizontally, but the much shorter flintlock musket and bayonet combination was obviously very differently balanced. This made it possible to revert to a much handier and more natural way of carrying a flintlock musket and the attached bayonet levelled at the waist. This sensible alteration appears to have originated in the French service, although curiously it does not appear to be illustrated in any of the various publications illustrating the manual exercise. The Prussians then took it up, and it was in imitation of them that James Wolfe introduced it to the British Army.

Not everyone was impressed by the innovation, and after he saw it demonstrated at a review on 15 July 1759, Captain John Knox of the 43rd Regiment of Foot scathingly described the new method: 'The left hand under the swell below the lowermost rammer-pipe, and the right hand a-cross the brass at the extremity of the butt – Thus was the firelock secured, which he poked out before him, in like-manner as an indolent hay-maker turns hay with a forked pole ... I thought it ludicrous' (Knox 1914: I.422).

As an illustration of this new posture in William Windham's *A Plan of Discipline, Composed for the Use of the Militia of the County of Norfolk* unambiguously shows, the 'brass at the extremity of the butt' was not the buttplate itself, but the brass escutcheon plate on the neck, and notwithstanding the gallant captain's disdain, the posture won ready acceptance. This was because although the technique was very different from that practised previously, it actually did two things.

In the first instance, while the adaptation of pike drill used up until that point permitted a slow and hopefully ominous advance, carrying the musket at waist level permitted a much faster advance, increasing eventually to double-quick time (theoretically, 180yd/min). While this



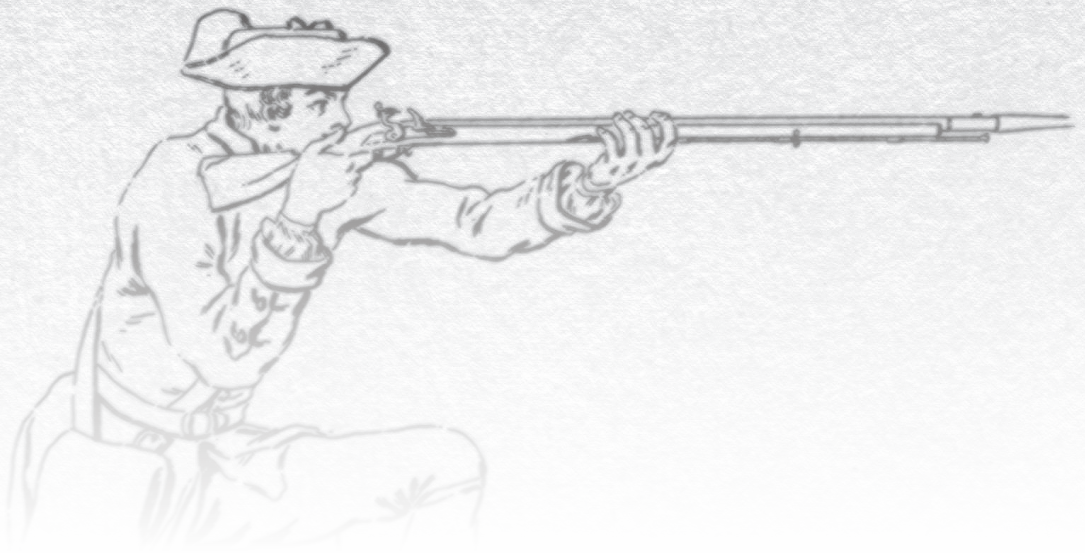
'Push your bayonet!' demonstrating how the thrust was propelled forward by the right hand on the buttplate. This is a technique which was only effective when performed by a closely formed body of troops.



The mock monumental inscription in the bottom right of this contemporary illustration declares that it is 'Dedicated to the officers and privates of the St. James Westminster Loyal Volunteer Regiment. This plate represents their uniform in the position of the new charge bayonet'. While the depiction of the uniform of this typically middle-class, part-time volunteer unit in the early 1800s is interesting in itself, it is astonishing to see a reversion to the old and long-abandoned method of charging and pushing a bayonet as if it were a 17th-century pike being described as 'new'. Needless to say, the technique did not catch on. (Anne S.K. Brown Military Collection, Brown University Library)

speed inevitably led to those 'loose files and American scramble', it was still possible to maintain a fair degree of control and unit integrity while at the same time much more effectively intimidating the enemy.

Secondly, even if the enemy resolutely refused to be intimidated, holding the flintlock in this manner meant it was able to be wielded in a more natural and therefore a more effective manner in hand-to-hand combat. Consequently, all manner of bayonet fencing drills were invented and promoted for soldiers acting in unison or singly, culminating in the gymnastic displays of the French *zouaves* and their imitators. In actual practice, of course, real fights – albeit rather infrequent – remained decidedly robust, with individual technique varying from the cool professionalism displayed by the actor Nigel Green in the film *Zulu*, to the murderous enthusiasm of those Confederate soldiers who flung bayoneted muskets as if they were javelins into the huddled masses of Union soldiers trapped in the Crater at Petersburg on 30 July 1864.



IMPACT

The dominance of infantry firepower

The impact of the flintlock musket, both on the battlefield and indeed on world history, was quite literally incalculable. ‘In war,’ declared Generalfeldmarschall Hindenburg, ‘only what is simple can succeed’ (quoted in Guderian 2000: 29). That was certainly true of the flintlock musket. It succeeded because above all, it was simple enough to be manufactured on an industrial scale even before the advent of bespoke machinery; contrary to the impression sometimes given in films and popular histories, it was even simpler to load and fire it; and officers no longer had to co-ordinate their movements and tactics with other, differently equipped troops, such as pikemen. The flintlock musket could literally be carried anywhere, not just on the battlefield but wherever a man could go on foot or on horseback; for great distances through forests; over mountains and deserts; by boat or into the tallest rigging of a ship – and then be readied for use at once. It was also adaptable: it could be fitted with a bayonet or even a cup used to discharge hand grenades; it could have its barrel rifled for greater accuracy, or shortened to be more convenient for a horseman. Within 50 years of its introduction, the flintlock musket was so ubiquitous as to be completely taken for granted, and had changed the face of warfare forever.

A UNIVERSAL WEAPON

The true impact of the flintlock musket may in fact be summed up by the rather innocuous term; ‘a stand of arms’. Precisely what was meant by this term seems to have varied a little from time to time and from army to army, but at the very least it comprehended the flintlock musket itself, together with a sling and a bayonet. Frequently, at first issue it also

American Minutemen or local militia fire upon British forces at the battle of Concord Bridge, 19 April 1775, thus beginning something of a military as well as a political revolution. The ready possession of flintlock muskets meant that untrained farmers and tradesmen could more or less successfully engage regular troops in a manner which would have been unthinkable in earlier times. That is not to say that they would have been the equal of those regulars in a more formal engagement; but as the insurgents clearly demonstrated at Concord Bridge and in the long-running fight that followed, they could inflict what might over time prove to be crippling losses on regular troops, while at the same time deliberately avoiding a conventional close-range firefight for which they lacked the necessary training, discipline and sometimes even the ammunition required to win. (© North Wind Picture Archives / Alamy)

included the basic accoutrements of cartridge box and belt and a means of carrying the bayonet, together with some basic tools including a turnscrew for changing or adjusting the flint or removing the lock, and a picker and brush for cleaning out the touch-hole and priming pan. It was in short a simple, self-contained package or kit which could be issued as and when required to create an instant soldier.

Quantities of flintlocks were therefore expressed in so many stands of arms, and in supplying these self-contained kits by the hundreds and thousands governments could equip regiments and indeed sometimes whole armies or proxy armies. At the battle of Sheriffmuir on 13 November 1715, for example, not all of the Jacobite rebels were wild Highland clansmen. A very substantial proportion of them were in fact Lowland Scots armed with flintlock muskets smuggled in from France. Most, if not all of them, were obviously raw recruits, but once equipped with those muskets, it had not taken long to knock them into some kind of shape. British officers were therefore astonished and perhaps a little dismayed by how well they performed in action. Argyle's second-in-command, Major-General Wightman, was moved to say: 'I never saw Regular Troops more exactly drawn up in Line of Battle, and that in a moment.' Another officer noted that they fired 'by ranks each rank retreating and not in platoons', which might have been accounted old-fashioned, but it was a simpler technique for new troops to master; while another witness admitted that the Scots 'kept up their fire longer than could have been expected'. Indeed, after 15 minutes' heavy firing, not only were the Jacobites still holding their own against the British regulars' platooning, but at one point they even sent Evans' Dragoons reeling back in some confusion amid a heavy shower of musket balls which inflicted



numerous casualties. It eventually took the Scots Greys to save the day, not by tackling the Jacobites head-on but by rolling up the rebel flank (Reid 2014: 132–34).

Nor was this episode exceptional, for exactly the same was true during the American Revolutionary War. The Patriot regiments might not have been the equal of the British regulars sent against them – at least not at first – but they owed their existence and their eventual victory to the flintlock musket which instantly turned farmers into soldiers. So, too, with the French revolutionary armies in the 1790s, and all the other armies that followed or fought against Napoleon in Spain and Germany and beyond; massed armies, far bigger than those of the 17th and 18th centuries. Some of these citizen armies suffered terrible defeats, of course, but even if one army or another were destroyed, others were very quickly raised to replace them – and all made possible by the universal availability of the simple but effective flintlock musket.

WORLDWIDE IMPACT

Of itself this was impressive enough, but beyond Europe and North America, the impact of the flintlock musket was arguably even greater, and was most dramatically demonstrated in the Far East, first by the French *Compagnie des Indes* and then by Britain's East India Company. Oddly enough, neither the French nor the British trading companies actually set out to conquer India, and indeed their respective boards of directors continually tried to avoid conflict as being expensive in itself and disruptive to trade. However, the 1740s saw the rival companies become increasingly involved in local politics as each sought to improve its position at the expense of the other. Thus at San Thomé, near the southern trading settlement of Pondicherry, on 4 November 1746 a small French army found itself facing a much larger Indian one belonging to the Nawab of the Carnatic. Posted behind the Adyar River, the 10,000-odd Carnatic troops, although individually no doubt as brave as any, were a traditional Indian force as undisciplined and as variously armed with

Sepoys of the 3rd Battalion at Bombay 1773, depicted by Mary Darly (*fl.* 1762–76). Of the three military establishments maintained by Britain's East India Company, that of Bombay was the smallest and least developed in the 18th century, and although published in 1773 this illustration probably provides a fair representation of the Company's earliest uniforms. Essentially, the soldier is dressed entirely in native clothing with the addition of a loose red jacket on top, but he is rather more clearly identified as a soldier by his flintlock musket and bayonet and by the obvious fact that he has been trained by a European drillmaster. His accoutrements, if accurately depicted, appear odd and may represent some kind of powder flask and bullet bag, but it is very difficult to say. Note that the right-hand figure also appears to be carrying a cane, perhaps as a non-lethal weapon for use against civilians. (Anne S.K. Brown Military Collection, Brown University Library)



In this detail from a depiction by Henry Martens (1790–1868) of the battle of Gujrat (or Goojerat), 21 February 1849, during the Second Anglo-Sikh War, the trio of sepoys look very different from their Bombay counterparts of nearly a century before and have clearly been completely assimilated into the European military system. Their uniforms are all but identical to those worn by the East India Company's European troops and British regulars, and only their dark-skinned features and facial hair identify them as Indians. Just as importantly, and in contrast to the ambiguity as to the type of accoutrements carried by their Bombay forebears in the Mary Daryl print of 1773, these men are carrying standard European-pattern belts and pouches. (Anne S.K. Brown Military Collection, Brown University Library)

matchlock muskets, bows, pikes, swords and other edged weapons as any army of the Eighty Years' War in the Netherlands or the Thirty Years' War in Germany. Most of the *Compagnie des Indes* forces opposing them were similarly equipped local mercenaries, but among them there were 350 European soldiers. There was nothing special about these soldiers; they were not well-trained or disciplined veterans, but rather the usual collection of the desperate and the criminal, and a few genuine adventurers, most of whom had left their home country for their country's good. However, unlike their opponents, all of them were armed with flintlocks and bayonets.

Finding the Nawab's men showing no immediate inclination to advance, the Swiss officer who commanded the *Compagnie* troops, Major Louis Paradis, gallantly decided to attack. With those 350 Frenchmen at his back, Paradis splashed straight across the river, had them fire a single volley and then immediately led them forward again with fixed bayonets. To the astonishment of all, he won a stunning victory as the Nawab's men, reeling from that volley and thoroughly intimidated by the bayonet charge that followed, scattered and fled in confusion. Paradis, as the historian Sir John Fortescue memorably wrote, had 'showed us the secret of how to conquer India' – with flintlock musket and bayonet. The lesson was quickly taken to heart, and in what amounted to a rerun of Paradis' victory just over ten years later it was the East India Company's turn. At Plassey on 23 June 1757, a similarly outnumbered British force led by Colonel Robert Clive stormed forward with musket and bayonet and utterly defeated the Nawab of Bengal in a battle which traditionally marks the beginning of the British Empire.



Although the decisive attack was carried out by Europeans, as many as two-thirds of Clive's troops at Plassey were *sepoys* – locally recruited Indian soldiers tentatively trained and equipped in the European manner with flintlocks and bayonets. Such was the success of this experiment that over the next 100 years the East India Company's armies became overwhelmingly comprised of *sepoy* units. Significantly, the local rulers were themselves equally capable of learning the lessons of San Thomé and Plassey. Consequently, the Company's troops very soon found themselves fighting against other equally well-equipped *sepoys* organized and trained for those native princes by European mercenaries. The Mahrattas, who were defeated with considerable difficulty during a series of wars in southern India during the early 1800s, were a notable example, but more formidable still was the *Khalsa* or Sikh army in the north. The two wars which the East India Company fought against the Sikhs in the 1840s were to all intents and purposes brutal and bloody European-style conflicts translated to the heat and dust of India. Indeed, had it not been for political infighting amongst the Sikh leadership, the Company might have been badly defeated – and even then victory was a very close-run thing indeed.

Nor did it end there. By the middle of the 19th century, European methods of warfare based around the flintlock musket and its bayonet had spread around and dominated the world except in the closed empires of China and Japan, and even they would have substantially assimilated them before the century was out. European artillery also played a part in this transformation, of course, but it was the flintlock musket which initiated the process.

THE RISE OF LIGHT INFANTRY

Thus far, European armies still generally held to the legacy of Prince Johan of Nassau and his drill books, which instilled the immutable principle that, just as in classical times, constant drill and the inculcation of strict discipline were absolutely necessary to create soldiers. The problem thereby was that while Frederick the Great's Prussian Guards undoubtedly represented the perfection of that ideal, they were a very expensive commodity indeed. There is an exact parallel here with the British Army of 1914, which was small – perhaps contemptibly small – but yet reckoned to be the most professional in the world. Nevertheless, within four desperate months of fighting, culminating in the First Battle of Ypres in October–November 1914, it had had been all but destroyed; and those who replaced them were very different in character. Exactly the same had been true of those Prussian, Hanoverian and British regulars, so ferociously trained in platoon firing before the Seven Years' War (1754–63) and equally quick to waste away once it began.

It was at this point that the flintlock musket came into its own, by making it possible to raise not just replacement drafts for veteran units, but also to create and deploy whole new regiments very quickly. It was the old story of those Jacobite rebels at Sheriffmuir in 1715, and indeed those

earlier French infantrymen deplored by Louvois. Given a flintlock musket and a bayonet, only a modicum of training sufficed to turn raw recruits into reasonably effective soldiers. More importantly, at the same time, and at first sight paradoxically, the flintlock also brought about an utterly fundamental change in the very nature of soldiering; one which was seemingly totally at odds with the rigid discipline required to turn an infantry battalion into what Frederick the Great approvingly described as a ‘moving battery’.

Ironically, Frederick himself was one of the first to fall foul of this revolution. In 1740 he had invaded the Austrian Habsburg possession of Silesia, opportunistically hoping to profit from the disputed Imperial succession. Unable to rely upon the German states, the young Empress Maria Theresa turned to her quite separate kingdom of Hungary for assistance. Not only did the Hungarian Army contribute hussars and regular infantry, but at the time the kingdom also included the Balkan provinces which formed a volatile frontier with the Turkish empire, and so there also appeared hordes of irregular cavalry and infantry, promiscuously referred to as *Crabbates* (Croats) and *Pandours*.

These wild *Grenztruppen* (frontier troops) knew nothing of discipline, but all of them were armed with flintlock muskets, and instead of standing in a rigid battle line and marching at a regulated pace, they moved and fired individually as part of a loose cloud of skirmishers. In the open they were easily ridden down by cavalry or brushed aside by regular infantry, and were consequently prone to running away to avoid either. In close country, however, whether wooded or lined with hedges or cluttered with villages and other settlements, it was a very different matter. There they made sufficient nuisance of themselves to compel their opponents to reciprocate by raising their own irregular units of ‘light infantry’. According to the Prussian military theorist and reformer Gerhard von Scharnhorst:

Immediately after the battle of Mollwitz, where [Frederick] experienced and recognised his lack of such units, he made it his first task to strengthen his army with light troops. By the Second Silesian War he was able to oppose the Austrians with a relatively equal force. His example was followed by the French, the Hanoverians and the Saxons, all of whom founded units of this branch of the service. Nevertheless the proportion of these troops to line formations remained extremely small ... (Quoted in Gates 1987: 11, 24)

Frederick had done so grudgingly and with obvious distaste, characterizing his own *Frei-bataillone* as being comprised of ‘Adventurers, deserters and vagabonds who are distinguished from the regular infantry only by the lack of what made the infantry strong, namely, discipline’ (quoted in Gates 1987: 24). In complete contrast, Frederick’s then allies, the French, took a rather different view of the matter. They did not quite share his concern over maintaining a rigid discipline and enthusiastically embraced the individualism required of flintlock-armed light infantrymen. The reluctance of Louvois and his master King Louis XIV to embrace the

flintlock was not mere conservatism or a fear that the pikeman was going out of fashion, but rather that those carrying flintlock muskets preferred to fight à *tirailleur* as individual sharpshooters, which after all accorded very closely with the later thinking of influential officers such as Maurice de Saxe and the Chevalier de Folard.

In the French service, the celebrated Chasseurs de Fischer were formed at Prague in November 1743 under the patronage of Saxe himself. Initially mustering just 45 infantry and 15 horsemen, the *chasseurs* (huntsmen) soon grew in numbers, and in the following year were joined by several other similar corps including the whimsically named (and eccentrically dressed) Arquebusiers de Grassin. When deployed properly, these *chasseurs* proved to be just as effective as the Balkan originals. It was the subsequent Seven Years' War, however, when such units came to the fore.

The flexibility offered by the flintlock musket had already led to the formation of specialist sub-units within ordinary infantry battalions, distinguished by their ability to operate beyond the confines of the formal, tightly disciplined firing line. Grenadiers were the first, originally tasked with acting as skirmishers in the assault, or in the defence of fortified places. Slinging their muskets on their backs to leave their hands free, they were expected to scramble over or through obstacles, toss hand grenades and perform all manner of wonders. In time, as the requirement for hand grenades diminished, these grenadier sub-units were to a large degree absorbed into the conventional battle line, but the tradition remained of regarding them as self-reliant and employing them as and when required on detached duties. Such was the demand for units capable of operating independently that the French first began supplementing their grenadiers by forming ad hoc *picquets* or detachments drawn from the ordinary fusilier companies, and then during the Seven Years' War turning them into permanent formations, dignified with the title of *chasseurs*. Similarly, although very much slower off the mark, by the end of the war the British Army too had formed *chasseur* companies which in this case became more formally designated as Light Companies. A number of German states also retained small *Jäger* units armed with rifled flintlocks, recruited (or at least reputedly recruited) from foresters, gamekeepers and the like.

However, being drawn as they were from the ranks of existing regiments, these units were a finite resource not easily expanded when the early encounters between light troops at the outset of the war rapidly spiralled out of control. All too often these units, especially when brigaded together in ad hoc battalions, were badly overworked. As Saxe acerbically complained, 'grenadiers are wanted everywhere. If there are four cats to chase, it is the grenadiers who are demanded, and usually they are killed without any necessity' (Saxe 1944: 41). This in turn imposed a considerable drain on their parent units, not only in the immediate term by milking the ordinary fusilier companies of men to

Prior to the advent of the *Crabbates* and their imitators, European armies did have a limited number of light troops in the form of the regimental grenadier companies. This sketch of a fur-capped British grenadier of the 1690s, after C.C.P. Lawson (1880–1967), perfectly illustrates some of the versatility of the flintlock musket, slung on the soldier's back and thereby leaving his hands free to negotiate obstacles.





British light infantrymen after sketches by Philip James de Loutherbourg (1740–1812) in the 1770s; this illustration usefully shows how their clothing and equipment differed from that of the other companies in the regiment, in marked contrast to the French practice as seen in the previous illustration [163]. The large powder-horn and the hatchet reflected experience in North America during the earlier French and Indian War, but both were soon discarded in Europe.

replace those casualties, but also in the longer term through the loss of potential NCO candidates.

Once again, and unsurprisingly so, the answer was the rather hasty raising of a new generation of ‘free’ battalions to carry out these detached operations and provide a back-up for the hussars and *Jäger* engaged in armed reconnaissance. By way of example, at the outset of the Seven Years’ War the Hanoverian Army and its allies initially mustered a total of 48 battalions of regular infantry, besides a further seven consolidated grenadier battalions, to which only two other new battalions were added in 1758. In contrast, light-infantry units saw a very substantial increase in strength: from just four companies of *Jäger* in 1756, they expanded to no fewer than 14 infantry battalions and 12 companies of mounted *Jäger* by July 1760, with a further five battalions added by the war’s end. They thus formed nearly a quarter of the Allied army. (See *Men at Arms* 460: *Frederick the Great’s Allies*.)

Impressive though it was in numerical terms, even this huge augmentation belied their actual significance in operational terms.

Once again, the flintlock musket facilitated not just tactical but strategic mobility. Equipment was cut to the minimum and essentially limited to what each man could carry on his own back. In the past, long-range reconnaissance and raiding had been the province of the cavalry or at least mounted soldiery of some description. Now the flintlock not only allowed infantry to move fast enough to make their employment on such operations feasible, but they had the firepower to inflict significant damage and afterwards fight their way out of trouble.

UNIVERSAL SOLDIERS

In order to be able to maintain the strength of regular regiments, the personnel for the new units, were often supposed to be sought in neutral states – or in Britain’s case, in previously untapped areas such as the Scottish Highlands. David Stewart of Garth, himself a light-infantry officer in his day, notes how in their first engagement in Germany one such regiment, Major Keith’s Highlanders, ‘distinguished themselves greatly by their intrepidity, which was the more remarkable, as they were no other than raw recruits just arrived from their own country, and altogether unacquainted with regular discipline’. Very similarly he remarked of Simon Fraser’s 71st Highlanders, raised at the outset of the American Revolutionary War in 1775, that:

Few British regiments ever went into immediate service with less discipline than this regiment, except Keith’s and Campbell’s Highlanders in Germany ... but they entered on every enterprise with spirit. In what manner these corps performed the duty expected of



A *chasseur* or light infantryman of the Régiment du Roi c.1780 is depicted in this hand-coloured engraved plate by Nicolas Hoffmann (1740–1832).

Interestingly, although the French had taken an early lead in the raising of light infantry and after the Seven Years' War had consolidated free corps such as Fischer's men into regular green-coated *chasseur* regiments, the only real distinctions accorded to the light companies formed in ordinary regiments of the line were the green epaulettes and green tufts in their hats – which contrasted with the striking cropped jackets, red waistcoats and sometimes quite fanciful helmets so enthusiastically adopted by their British counterparts. (Anne S.K. Brown Military Collection, Brown University Library)

them, the history of the times will show. Keith's regiment was, indeed, put to a more severe trial in being so early placed in competition with the veteran and chosen troops of France. The want of discipline of the troops opposed to Fraser's in America rendered the duty in forcing them less arduous; but they entered on every enterprise with spirit, and were highly conspicuous for courage, success, and the terror with which their advances inspired the enemy ... Such, indeed, were the constant and active duties, and incessant marching, actions, and changes of quarters of the 71st, that little time could be spared; and, therefore, little attempt was made to give them the polish of parade discipline till the third year of the war ... (Garth 1822: II.25, II.49–51]

Garth was careful always to present the Highland regiments in the best possible light; even so, the picture he paints is a significant one. These new soldiers were not fighting the Prussian Guards; instead, by and large, they were fighting units very similar in character to themselves, and doing so very effectively. This, of course, came at a time when military thinkers were already challenging the old assumptions about tactics and how best to use the flintlock, with the result that light infantry became to a degree respectable and even dashing fashionable, just as light cavalry did.

By the time of the Napoleonic Wars (1803–15), not only did light infantry account for a substantial proportion of the French Army, but ordinary line units were also expected as a matter of course to act as skirmishers as and when required. Experience in the early years of the French Revolutionary Wars blurred the distinction between line and light infantry to the extent that an officer named Duhesme claimed that 'By the end of 1793, the French armies had only light infantry' (quoted in Gates 1987: 21). That might have been something of an exaggeration, but the simplified tactics demanded by these new soldiers, whether serving in free battalions or in the revolutionary armies in North America and in France, were one reason for the adoption of the file firing described in the previous chapter; and this in itself encouraged the development of skirmishing or *tirailleur* tactics, not only in light regiments but within ordinary line regiments as well.

A little surprisingly – notwithstanding David Dundas' constant efforts to stamp out the perceived laxity of 'loose files and American scramble' – in 1798 the Duke of York circulated an order to general officers pointedly reminding them that: 'The Regulations ... do not forbid the Practice of the Exercise peculiarly adapted to Light Troops, which Practice is on the contrary particularly recommended, to enable *any* Corps to act independently when circumstances may require it ...' (quoted in Gates 1987: 22 – my emphasis). That this seemingly extraordinary order was taken very much to heart is clearly illustrated in an account by a soldier named William Brown of the part played by the 45th Regiment of Foot in the battle of Orthez on 27 February 1814:

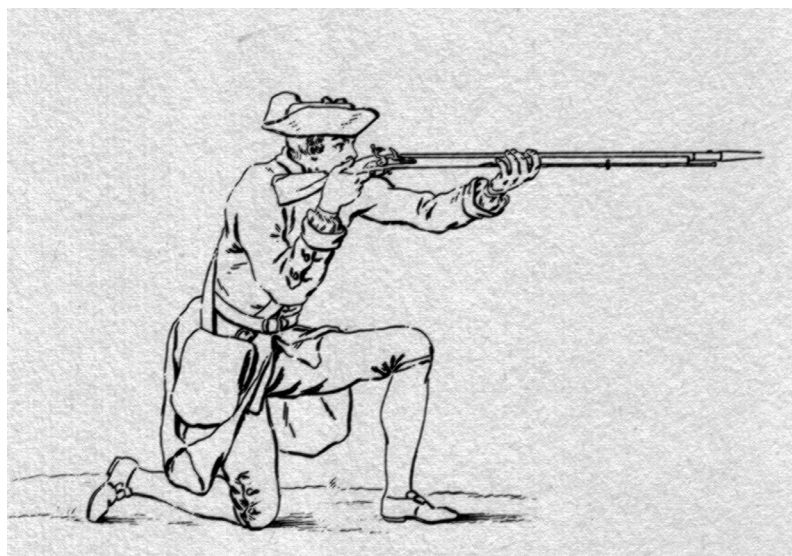
Meantime the enemy's skirmishers advanced to the brow of the hill, and began to fire into us, until the Adjutant General, a most gallant officer, came galloping from the left exclaiming, 'Good God! General

Brisbane, why stand here while the brigade gets cut up? Form line, and send out the 45th skirmishing.' Two companies being left with the colours, the rest of us ascended the hill, to be received in such a manner as I had never before experienced. We were but a skirmishing line opposed to a dense column supported by artillery and cavalry. The bullets flew thick as hail, thirteen men of my company alone fell within a few yards of me on the brow of the hill. Notwithstanding we pressed on, and the enemy after dreadful carnage gave way, and left us in possession of a ditch, which we held until the brigade came up in line. We then gave three cheers, charged the enemy's light troops, and drove them from another ditch parallel with the one we had just taken. Having repeatedly charged, and been charged in turn, we got on the height, from which we had a complete view of the dark masses of the enemy in column, one of which was moving against us, the officers hat in hand waving on the men in advance. By this time we were greatly diminished – nearly half down or disabled – and might have given way, if a staff officer had not come up at the critical moment and encouraged us to hold our ground, as we should be relieved in a minute. (Quoted in Oman 1930: VII.359–60)

The 45th Regiment of Foot was an ordinary regiment of the line, not a light-infantry corps, and so it would be difficult to find a more dramatic contrast to Robert Parker's account of the 18th Regiment of Foot and its platoon firing at Malplaquet just over a century earlier.

INDIVIDUAL FIRE

At the same time, the process was going still further with a steadily increasing emphasis on individual aimed fire. Following up that earlier order, another circular in 1801 recommended that 'Individuals ... [should



The use of aimed fire, rather than simply levelling, is very clearly depicted in Windham's *A Plan of Discipline, Composed for the Use of the Militia of the County of Norfolk*, itself based on French practice.



be] occasionally detached and instructed how to act as Flankers, and as skirmishers in attacking, or repelling those of the Enemy; ... accustomed not to fire, but when they have a good Mark and Aim' (quoted in Gates 1987: 143). It is worth emphasizing once again that the 'flankers' or 'marksmen' referred to were not members of the regimental light companies, but were instead drawn from the ordinary battalion companies.

Individually aimed fire à *tirailleur* was by no means an innovation, of course, but rather a belated acknowledgement of best practice originating in those cheap-and-cheerful *chasseur* units and in the ranger units in North America. Notwithstanding the test results quoted in the previous chapter, in practical terms the accuracy of the flintlock musket was in fact perfectly adequate and fit for that purpose. Indeed, it was probably a good deal more accurate than is generally acknowledged, the real problem being not the weapon itself but how it was actually handled. If this at first appears paradoxical in light of those results, it is important once again to appreciate that volley firing was not conducive to good marksmanship. As the Comte de Guibert wrote:

Those Prussian battalions, so famously esteemed for their order and execution, are those whose fire is less galling; their first discharge has precision and effect because this first shot is loaded out of action, and done with more attention and regularity; but afterwards in the heat and confusion of an engagement, they load in haste, and are inattentive to the well ramming of their charges. They are told that the great perfection of their exercise consists in making the most fires in a minute; no wonder

then if they pay such little attention to the levelling of their pieces. Busied with this imaginary effect of celerity, at the expense of teaching the true position of adjusting the aim, they have acquired no proper idea of the true theory of their shot or fire. (Guibert 1781: I.162–63)

The same alas was no doubt true of Richard Parker's men at Malplaquet, who it will be recalled had only fired that first shot from each platoon. On the other hand, encouraging a soldier to shoot as an individual rather than as part of a platoon meant he was able to do so in the manner best suited to the circumstances. In 1715 John, Master of Sinclair, recorded how during a rather tense stand-off with some Highlanders, 'they pretended they did not understand me and most cockt their pieces, and presented, to shoot me, and some lay down on their bellies to take the better aime' (Sinclair 1858: 101). It is interesting to find such an early reference to lying down to take better aim, but lying down or otherwise supporting a musket while taking careful aim was always going to produce better results than those recorded in the formal trials of volley fire delivered by men standing rigidly upright. Interestingly, the eccentric Colonel George Hanger bombastically declared in 1808 that:

A soldier's musket, if not exceedingly badly bored, and *very crooked*, as many are, will strike the figure of a man at 80 yards, it may even at 100 yards; but a soldier *must be very unfortunate indeed* who shall be wounded by a *common musket* at 150 yards, PROVIDED HIS ANTAGONIST AIMS AT HIM; and as to firing at a man at 200 yards with a common musket, you may just as well fire at the moon, and have as much hopes of hitting your object. I do maintain ... that NO MAN WAS EVER KILLED AT 200 YARDS by a common soldier's musket, by the person who aimed at him. (Quoted in Gates 1987: 139)

Notwithstanding the tone of his remarks, Colonel Hanger, a noted sportsman, was clearly confident that at ranges up to 100yd it was perfectly feasible to hit a man-sized target with a smooth-bored flintlock musket providing a proper aim was taken. Indeed, in fighting at close quarters, within and sometimes well within that optimal 100yd envelope, the soldier's own ability to hit a given target was – and still is – far more important than the theoretical accuracy of the weapon itself. As to shooting beyond that range, the evident falling-off in accuracy after 100yd might not have been as critical in tactical terms as it first appears. Significantly, after more than a century of equipping soldiers with long-barrelled rifles sighted up to 1,000m (1,094yd) or more, modern armies have now turned to short-barrelled assault weapons in response to the realization that – notwithstanding technological advances – most infantry combats still take place within that 100yd envelope.

What is more, when engaged at such a short distance there was often no time to aim properly, and it was necessary to resort to snap shooting. At close range, say within 25yd, snap shooting is actually a surprisingly

OPPOSITE In a foretaste of modern practice, this American officer carries a fusil or musket and bayonet. The 'C.C.' on his cartridge box probably stands for Continental Congress.



This depiction of the battle of Orthez on 27 February 1814 by William Heath (1795–1840) is conventional in composition and to a large extent fanciful, but it does provide a basic representation of the difficult ridge-top position which the 45th Regiment of Foot had to assault not in conventional close order, but in a dispersed firing line as skirmishers. Had he witnessed it, David Dundas would no doubt have been horrified. (Anne S.K. Brown Military Collection, Brown University Library)

effective technique which essentially amounts to relying on hand-eye co-ordination, or pointing and shooting in other words, rather than trying to squint uncertainly along a wavering barrel. Colonel Kenneth Mackenzie, who trained the British Army's regular light-infantry regiments for Sir John Moore, explained it thus:

A soldier who from habit, can bring his firelock in a line with the object he is looking at, has a good chance of hitting the Enemy ... even in the hurry and confusion of action because he is so instructed, that his firelock mechanically comes ... in a direct line with the object he is looking at ... for the eye naturally directs the hand to the object it is looking at. (Quoted in Gates 1987: 147)

And so they went forward carrying their flintlocks, with each man picking his own target; not just the regimental *chasseur* or *tirailleur* or light companies, or even for that matter the vaunted riflemen; not specialists but ordinary soldiers, first forming an increasingly heavy screen for the battalions behind and then, like the 45th Regiment of Foot at Orthez, replacing them and thus establishing the foundation of modern infantry tactics.



CONCLUSION

The success of the flintlock musket may be gauged not just by its iconic status and its long-term impact on the conduct of warfare, but also by the fact that in the immediate term it was upgraded rather than replaced. In 1806, the Reverend Alexander Forsyth successfully demonstrated a prototype percussion lock. Under this new system the clamp or cock was replaced by a hammer and the priming pan and frizzen by a tube filled with powdered fulminate of mercury, which detonated on being struck and flashed through the touch-hole to ignite the powder charge in the barrel.

Further development was required to refine the initial design for military use, by replacing the powdered fulminate with a paste varnished



After dominating battlefields for two centuries, thanks to a combination of Forsyth's percussion system and the Minié ball the development of the flintlock reached its culmination in the Pattern 1853 Enfield rifle-musket – a reproduction weapon is shown here – only for it to be rendered obsolete within a decade by breech-loaders. Mechanically, the percussion lock was similar to the flintlock, with the cock simply being replaced by a hammer. The priming pan and frizzen, however, were replaced by a nipple on which a copper cap was placed, which when struck flashed a flame to the powder charge in the barrel.



ABOVE The US 1816 Pattern Springfield illustrated here was, like its predecessor, a direct copy of a French Charleville-type weapon, in this case the ubiquitous *Modèle 1777* which had served Napoleon and his allies so well. At first glance the two are identical and indeed largely distinguished by their respective markings. This effectively served as the US Army's standard pattern musket until the adoption of the percussion system and even then soldiered on, sometimes but not always converted to percussion, up to the early years of the American Civil War. 1816 Pattern muskets were supplied in some numbers to the rebels in Texas in 1836 and afterwards the short-lived Republic of Texas adopted it as the standard firearm for its regular army. (NRA Museums, NRAmuseums.com)

to a copper wafer or cap, but in November 1831 the first contract was placed for converting 200 India Pattern flintlocks to a percussion system. Extensive testing followed, paralleled on the Continent and in North America, and in 1836 the first large-scale trials followed, culminating in the Pattern 1838 musket, set up from the beginning with a percussion lock. In parallel, a Pattern 1839 musket was also approved to utilize existing stocks of parts originally intended for setting up flintlocks. Both were then followed by the 1842 pattern, but to all intents and purposes all three patterns were essentially flintlock muskets fitted with improved locks, and were handled and employed exactly as before.

It was much the same in the United States of America, where not only were thousands of 1816 and 1822 Pattern flintlocks converted to the percussion system, but some even survived unconverted until the American Civil War in the 1860s. For lack of anything better, thousands were issued to Confederate units early in the war, especially in the heartland states, and some even survived to the war's end in the hands of home guard units. Similarly, the French Army adopted its own pattern percussion musket in 1840, but largely relied on flintlock conversions until the invention of the Minié ball opened the way for the development of the rifle-musket as a general-issue weapon rather than one for specialists. The Minié ball was a slightly undersized conoidal bullet with a hollow base. On being fired, a wood or clay plug in the base then forced the lower part of the bullet into the rifling. It could therefore be loaded just as quickly and easily as a conventional smooth-bored musket, but was obviously capable of far greater accuracy and a longer range.

The Duke of Wellington, still commander-in-chief of the British Army at the time, approved the introduction of a Minié rifle for general issue, but insisted that it should be referred to as a rifle-musket, not a rifle, as he wished to preserve the tactical distinction between infantry of the line and specialist sharpshooters. Hence the term rifle-musket, as epitomized by the famous Pattern 1853 Enfield which was fired using a percussion lock and had a rifled barrel, but which arguably represented the culmination of 200 years of the flintlock musket.

There was also one last curious survival. As late as World War I, by which time the British Army had progressed to the Lee Enfield bolt-action rifle with its ten-round magazine, the term musketry was still synonymous with the crackle and roar of small-arms fire.

OPPOSITE Among the last users of the flintlock musket in combat were the Americans, in the US–Mexican War of 1846–48. A militiaman of the Cleveland Grays is depicted in this pencil-and-watercolour sketch by Jarvis Frary Hanks (1799–1853). (Anne S.K. Brown Military Collection, Brown University Library)



GLOSSARY

BAYONET:	Blade affixed to the muzzle of a musket; originally a dagger plugged directly into the bore but latterly of triangular section offset from the barrel by means of an external socket.
BRIDLE:	Keeper plate within lock mechanism.
CARBINE:	Lightweight musket used by cavalymen, artillery crews and some light infantry; latterly a short-barrelled weapon, but not invariably so.
COCK:	External clamp which holds the flint; originally swan-necked, but latterly incorporating a reinforcing ring.
DOG:	Safety catch.
FIRELOCK:	Musket incorporating an intrinsic ignition mechanism, as distinct from a matchlock, which required an external means of igniting the priming charge.
FLINT:	Shard of quartz, knapped or shaped by striking flakes off to create a wedge shape with a sharp cutting edge which would strike sparks off hardened surfaces such as steel.
FRIZZEN:	Hardened steel plate (in North American usage, a hammer) off which sparks are struck by the flint to ignite the priming charge.
FUSIL:	Light musket; originally a French term and sometimes rendered phonetically in English as 'fusee'.
HAMMER:	See frizzen; not to be confused with the hammer of a percussion lock.
LOCKPLATE:	Metal plate to which all of lock components are attached.
NOSECAP:	Metal cap, strengthening the forend of the stock at the interface with the fixed bayonet.
PLATOON:	Infantry sub-unit used for fire-control purposes, but also slang for a volley.
PRIMING CHARGE:	Small quantity of gunpowder used to ignite the propellant charge.
PRIMING PAN:	Small pan external to the musket barrel which contained the priming charge used to ignite the propellant inside the barrel. A 'flash in the pan' is a term denoting a failure of the priming charge to ignite the propellant.
SEAR:	Linking piece between trigger and tumbler.
SIDENAILS:	Two transverse screw-headed bolts passing through the stock to secure the lock.
SIDEPLATE:	Small metal plate, usually of cast brass let into the stock on the reverse side to the lock to serve as an anchor for the sidenails.
SLING:	Leather strap intended to allow the flintlock musket to be carried hands-free.
SNAPHAUNCE:	Early form of flintlock mechanism.
STEEL:	See frizzen.
TUMBLER:	Lock component to which the cock (or, in percussion system, hammer) is attached.

BIBLIOGRAPHY

- Bailey, D.W. (1986). *British Military Longarms 1715–1865*. London: Arms & Armour.
- Blackmore, H.L. (1994). *British Military Firearms 1650–1850*. London: Greenhill.
- Chandler, David (1976). *The Art of War in the Age of Marlborough*. London: Batsford.
- Dundas, David (1792). *Rules and Regulations for the Formations, Field Exercise and Movements of His Majesty's Forces*. London: War Office.
- Gates, David (1987). *The British Light Infantry Arm c.1790–1815*. London: Batsford.
- Guderian, Heinz (2000). *Panzer Leader*. London: Penguin. Originally published in 1950.
- Guibert, Comte de (1781), trans. Lieutenant Douglas. *General Essay of Tactics*. London: J. Millan. Originally published in 1772.
- Hardin, Stephen (1994). *Texian Iliad: A military history of the Texas Revolution*. Austin, TX: University of Texas Press.
- Houlding, J.A. (1988). *French Arms Drill of the 18th Century*. Bloomfield, IN: Museum Restoration Service.
- Hughes, B.P. (1974). *Firepower: Weapons effectiveness on the battlefield 1630–1850*. London: Arms & Armour.
- Knox, John (1914–16). *An Historical Journal of the Campaigns in North America*. Toronto: Champlain Society.
- Lawson, C.C.P. (1961). *History of the Uniforms of the British Army Vol. III*. London: Norman Military Publications.
- Muir, Rory (2001). *Salamanca 1812*. New Haven, CT & London: Yale University Press.
- Oman, Charles (1902–30). *History of the Peninsular War*. 7 vols. Oxford: Clarendon Press.
- Parker, Robert, ed. D. Chandler (1968). *Memories of the Most Memorable Military Transactions*. London: Longman.
- Peterkin, Ernest (1989). *The Exercise of Arms in the Continental Infantry*. Bloomfield, IN: Museum Restoration Service.
- Reid, Stuart (2014). *Sheriffmuir 1715*. Barnsley: Frontline.
- Saxe, Maurice de, ed. T.R. Philips (1944). *Reveries on the Art of War*. Harrisburg, PA: Military Service Publishing Company. Originally published in 1757, but probably written or dictated in December 1732.
- Sinclair, John (1858). *Memoirs of the Insurrection in Scotland in 1715*. Edinburgh: Abbotsford Club.
- Stewart of Garth, David (1822). *Sketches of the Character, manners and present state of the Highlanders of Scotland*. 2 vols. Edinburgh: Constable.
- Terry, Charles Sandford (1917). *Papers Relating to the Army of the Solemn League and Covenant, 1643–1647. Volume 1*. Edinburgh: Scottish History Society.
- Tomasson, K. & Buist, F. (1967). *Battles of the '45*. London: Batsford.
- Walker, Edward (1705). *Historical Works: Brief Memorials of the Unfortunate Success of His Majesty's Army and Affairs in the Year 1645*. London: publisher not known.
- Wilkinson, Henry (1841). *Engines of War: or, Historical and Experimental Observations ...* London: Longman, Orme, Brown, Green, and Longmans.
- Willson, Beckles (1909). *The Life and Letters of James Wolfe*. London: William Heinemann.
- Wolfe, James (1780). *General Wolfe's INSTRUCTIONS to Young Officers*. London: J. Millan.

INDEX

Figures in **bold** refer to illustrations.

'Alternate Firing' 46–48, **52**

American Civil War **32, 33, 50–51, 52, 53, 54, 60, 76**

American flintlocks 77: 1795 Pattern **17, 38, 38**; 1812 Pattern **15**; 1816 Pattern **15, 17, 76, 76**; 1822 Pattern **76**

American forces/militias/rebels **4, 33, 38, 48, 53, 60, 62, 63, 72, 76, 77**

American Revolutionary War **4, 30, 48, 62, 63, 68**

ammunition 20–22, **47**; types: buckshot **19**; musket ball **3, 4, 5, 9, 18, 19, 20, 29, 34**; Minié **9, 75, 76**; 'running ball' **29**; 'small shot' **19**

Austrian flintlocks/forces **6, 17, 39–40, 58**

ball/bullet bags **20, 21, 21, 63**

battalion fire **48, 49, 54**

bayonet advances/charges/thrusts **31, 31, 40, 48, 52, 54, 55, 56, 58–59**

bayonets **4, 6, 9, 18, 21, 22, 23, 24–25, 24, 35, 35, 38, 40, 46, 47, 48, 54, 55, 55, 56, 57, 58, 59, 60, 60, 61, 62, 63, 64, 65, 72**

bayonets, fixing of **25, 30, 31**

belled muzzles **23**; belly boxes **21, 47**

belts and straps **21, 25, 35, 62, 64**

British Army forces **33, 58, 76**: dragoons **62**; grenadiers **47, 67**; infantry **16, 20, 23, 26, 36, 37, 40, 41, 41, 42–43, 43, 44–45, 46, 47, 47, 48, 49, 52, 60, 62, 63, 67, 68, 68, 70–71, 73, 74**; regts **16, 20, 21, 22, 23, 24, 35, 36, 37, 42, 44–45, 46, 47, 49, 60, 62, 63, 70–71, 74**

British flintlocks **14, 15, 18, 19, 41, 42–43**; features **14, 15–16**; manufacturing of **12**; service life **16, 33**; types: carbines **9, 17, 20, 26**; India Pattern **4, 16, 17, 18, 28, 42, 76**; Land Pattern **14, 15, 18, 19**; Long Land Pattern **17**; Militia Pattern **17**; New Land Pattern **16, 17**; Short Land Pattern **14, 16, 16, 17, 18, 20, 42–43**

Canada, fighting/forces in **35, 40, 46**

carbines **9, 17, 20, 26**

cartridge boxes **21, 47, 62, 72**

cartridges **20–21, 21–22, 29, 30, 31, 34**

cavalry forces/weapons **7, 17, 18, 20, 26, 38, 66, 67, 71**

Chevalier de Folard **40, 67**

cleaning equipment/tools **21, 62**

cocks **7, 8, 10, 11, 12, 13, 18, 31, 75**

Compagnie des Indes forces **63, 64**

company fire **54**

crown and cypher marks **16, 18**

Demorinet, François **38–39, 41, 43**

division fire **44–45, (46), 48, 49**

dragoon muskets **18, 20, 24, 25, 42–43**

Dundas, Maj-Gen David **46, 49, 54, 70, 73**

East India Company forces **4, 16, 17, 19, 63, 63, 64, 64, 65**

English Army forces **21, 22, 37, 48, 55, 58**

English Civil War **22, 37, 55**

escutcheon plates **16, 59**

feu de ballebaude **40, 49, 52, 53**

file firing **38, 50–51, (52), 53–54, 70**

firelock companies **10, 22**

firelock muskets **5–6, 7, 10, 20, 22, 35, 74**

'Firing by Extraduction' **36, 37**

'Firing by Introduction' **37**

firing lines (dispersed) **73**

Flanders, fighting in **56, 57**

flintlock carbines/fusils **17, 26, 27**

flintlock mechanism **10–12, 13**

flintlock muskets **7, 15, 26, 27, 28, 47, 63**: accuracy and range **32, 34–35, 72–73**; aiming and firing **32, 33, 34, 35, 53, 56, 57, 62, 77**; carrying **25, 31, 31, 35, 56, 57, 67, 67**; demand for **27–28**; loading and reloading **29, 30–31, 32, 35, 38**; rate of fire **32**; reliability **33**; service life **16, 33**; weights **14, 20, 28**

flintlock pistols **26**

flints **5, 7, 10, 11, 13, 19, 33, 62**

Forsyth, Revd Alexander **13, 75**

Frederick the Great **4, 40, 46, 65, 66**

'free' battalions **66, 68, 70**

French Army forces **9, 21, 22, 25, 27, 28, 39, 58, 63, 70–71, 73, 76**: *chasseurs* **67, 69, 72, 74**; fusiliers **40, 67**; grenadiers **6, 67**; Guards **36, 37, 56, 57, 69**; infantry **21, 27, 38–40, 38, 42–43, 66, 70**; regts **20, 36, 37, 46, 56, 57, 67, 69, 69**

French flintlocks **4, 11, 12, 14, 27, 38–40, 38, 62**: Modèle 1716/1717/1728/1729 **17**;

Modèle 1763 **17, 38**; Modèle 1764 **42**;

Modèle 1777 **14–15, 17, 28, 38, 76**

frizzens (steels) **5, 11, 12, 13, 33, 75**

fusiliers **24, 40, 67–68**

fusils **11, 20, 27, 38, 72**

German forces **15, 67, 68**

grenadiers **23, 24, 27, 34, 35, 41, 42, 44–45, 46, 47, 56, 57, 67, 67, 68**

gunmakers **12, 14, 16, 18, 28**

gunpowder **4, 5, 13, 18, 19, 20, 21, 29, 30, 33, 34**

halberds **47**; hammers **75, 75**

hand grenades **25, 56, 57, 61, 67**

'handgonne' **4, 7**; hatchets **67, 68**

Hawley, Lt-Gen Henry **34, 35–36, 39, 46, 56**

Hay, Lord Charles **37**

India, fighting/forces in **40, 63–65, 64, 68**

individual (aimed) firing **36, 71–74, 71**

Italian pistols **10**

Jacobite rebellion **33, 56, 58, 62, 65**

Johan of Nassau, Prince **29, 36, 40, 65**

locks **5, 11–12, 31, 33, 42, 62, 75, 75, 76**

Londonderry, siege of **26**

Louvois, Marquis de **27, 65**

Malplaquet, battle of **20, 40, 42–43, 71, 73**

manual exercise **29, 30–31, 30–31, 32, 40, 41, 41, 46, 49, 52, 70–71, 71**

Marlborough, Duke of **4, 41, 43**

matchlock calivers **27**

matchlock muskets **4–5, 5, 6, 11, 12, 15, 22, 26, 26, 28, 29, 36, 38, 41, 54, 55**

musketeers **6, 21, 26, 26, 27, 27, 29, 36, 37, 38, 40, 41, 55, 56**

muskets, origins of **4–5**

Napoleonic Wars **15, 16, 34, 40, 49, 63, 70–71, 73, 74**

Parker, Capt Robert **20, 42–43, 71**

percussion locks **75, 75, 76**

percussion muskets **53, 76**

percussion system **13, 16, 38, 75–76**

pikemen/pikes **6, 22, 26, 26, 27, 28, 38, 40, 41, 55, 56, 58, 59, 60, 61, 64, 67**

platoon firing **41–43, 44–45, 46–48, 49, 52, 53, 54, 65, 71, 73**

pouches **64**

powder bags/bottles/boxes **20, 21**

powder flasks **21, 21, 63, 68**

priming charges/powder **4, 5, 7, 12, 13, 20, 33**

priming flasks **21, 21**

priming-pan covers **5, 10, 11, 12**

priming pans **4, 5, 8, 10, 12, 13, 29, 30, 33, 62, 75**

Prussian flintlocks **17**

Prussian forces **34, 35, 47, 58, 65, 72–73**

pyrites **7, 8, 10**

ramrod (rammer) pipes and ramrods **14, 18, 29, 30, 31, 32, 42–43, 58**

rank firing **38–39, 41–43, 48, 53, 62**

rifled firearms **9, 61, 67, 76**

riflemen and rifles **8, 9, 9, 28, 74, 76**

rifle-muskets **14, 16, 53, 75, 76**

Saxe, Maréchal **35, 39–40, 53–54, 58, 67**

Scottish forces **10, 27, 35–36, 39, 46, 55, 55, 56, 58, 59, 62–63, 68, 70, 73**

sears **7, 8, 11, 12, 13**

sepoys **63, 64, 65**

Seven Years' War **34, 40, 46, 47, 65, 67, 68, 69**

sharpshooters **9, 32, 67, 70, 72, 74, 76**

skirmishers/skirmishing **67, 70–71, 72, 73**

slings/sling-swivels **25, 31, (56), 57, 61**

slow-match/match-cord **4, 5, 7, 10, 18, 21**

snap shooting **73–74**

snaphance/snaphaunce pistols **8, 10, 10**

Spanish flintlocks **5**: M1752 **17**

staffs/rests (*fourchettes*) **18, 26, 29, 37, 54**

ouch-holes **4, 12, 33, 62, 75**

umblers **11, 12, 13**

US–Mexican War **19, 76, 77**

volley fire **34, 36–37, 38–40, 42, 43, 44–45, 46, 48, 52, 54, 55, 58, 64, 72–73**

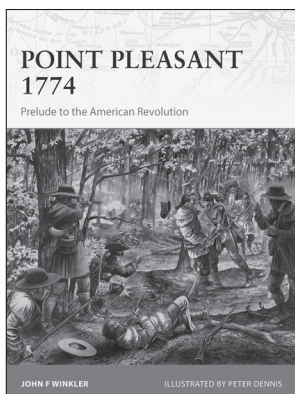
War of the Austrian Succession **36, 37, 46, 52**

wheel-locks **7–8, 8, 10**

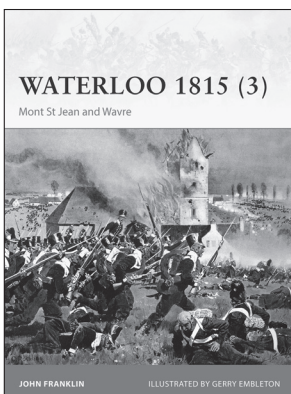
wing firing **48, 49**

Wolfe, Maj-Gen James **34, 35, 46–47, 48, 52, 58**

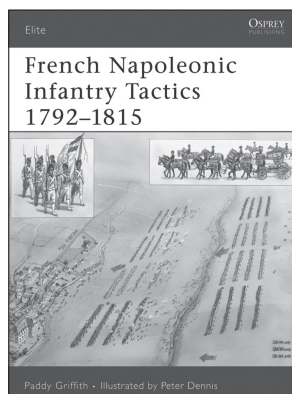
Discover more at www.ospreypublishing.com



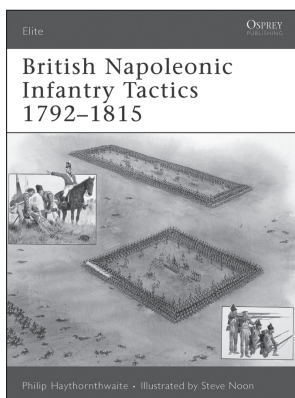
CAM No: 273 • **ISBN:** 978 1 4728 0509 6



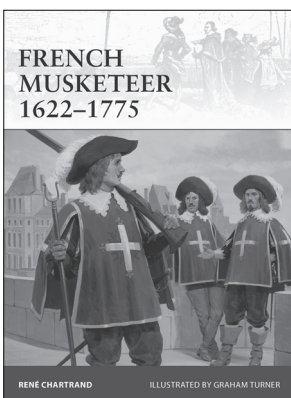
CAM No: 280 • **ISBN:** 978 1 4728 0412 9



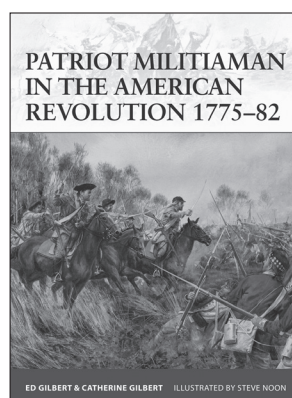
ELI No: 159 • **ISBN:** 978 1 84603 278 3



ELI No: 164 • **ISBN:** 978 1 84603 222 6



WAR No: 168 • **ISBN:** 978 1 78096 861 2



WAR No: 176 • **ISBN:** 978 1 4728 0754 0

SIGN UP FOR THE OSPREY NEWSLETTER AND WIN! 5 OSPREY BOOKS

Sign up to the *Osprey e-newsletter* to get all the latest news, great special offers, information about new releases and get an exclusive look inside life at Osprey. You will then be in with a chance to win some great prizes in our monthly prize draw.

Every month we will be selecting **one newsletter recipient** who will **receive any 5 Osprey books of their choice**. A range of other prizes, from exclusive artwork prints to free ebooks, will also be given away throughout the year to newsletter recipients.

Go to: www.ospreymailing.com

Enter your email address to register

